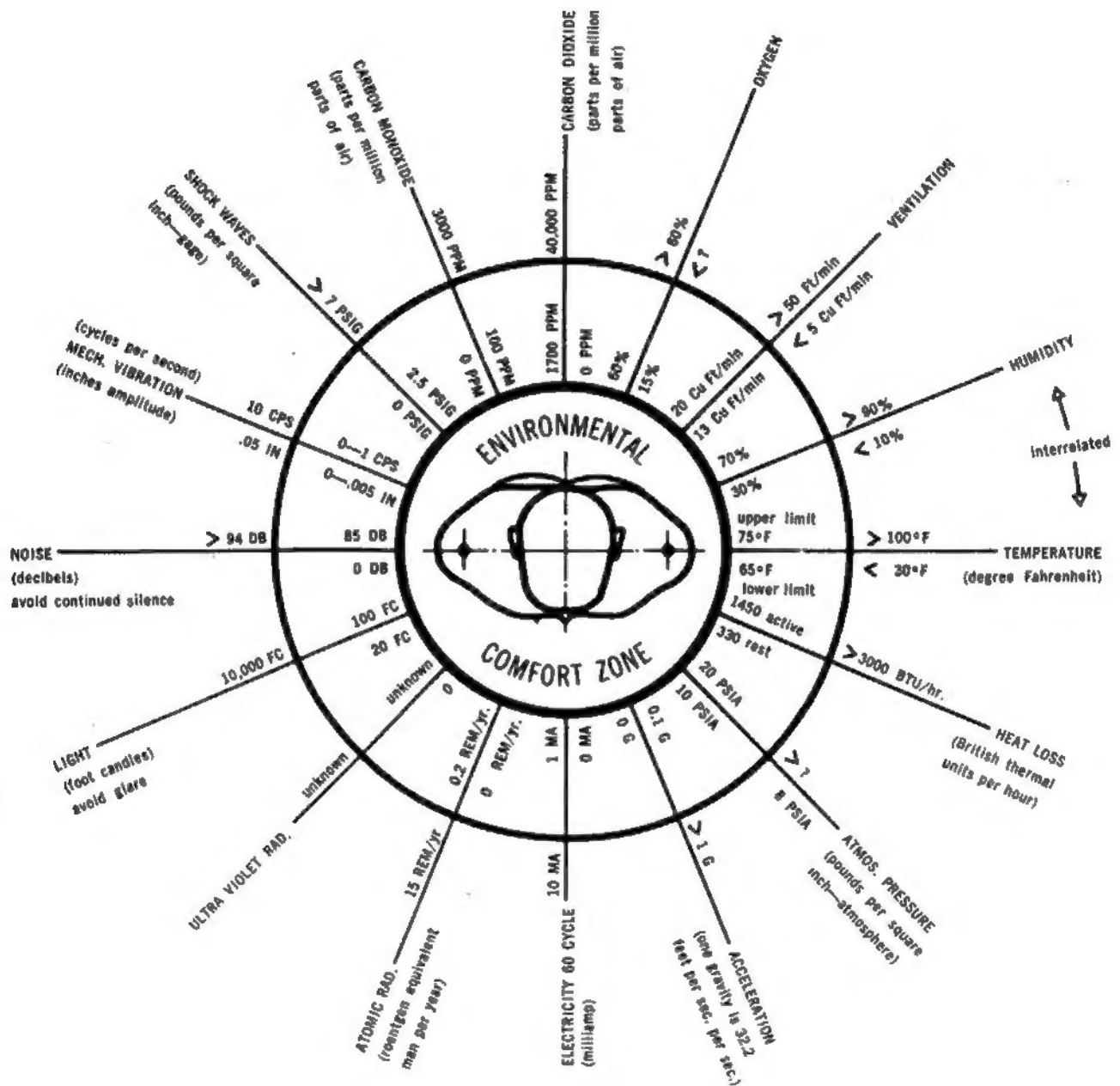


THE MEASURE OF MAN

HUMAN FACTORS IN DESIGN

HENRY DREYFUSS



The first circle is the bearable zone limit. Outside this limit great discomfort or possible damage is encountered. It is also necessary to consider: infra-red radiation, ultra sonic vibration, noxious gases, dust, pollen, and heat exchange with liquids and solids.

Note: All data here are subject to qualification, refer to reference sources; for complete information see bibliography.

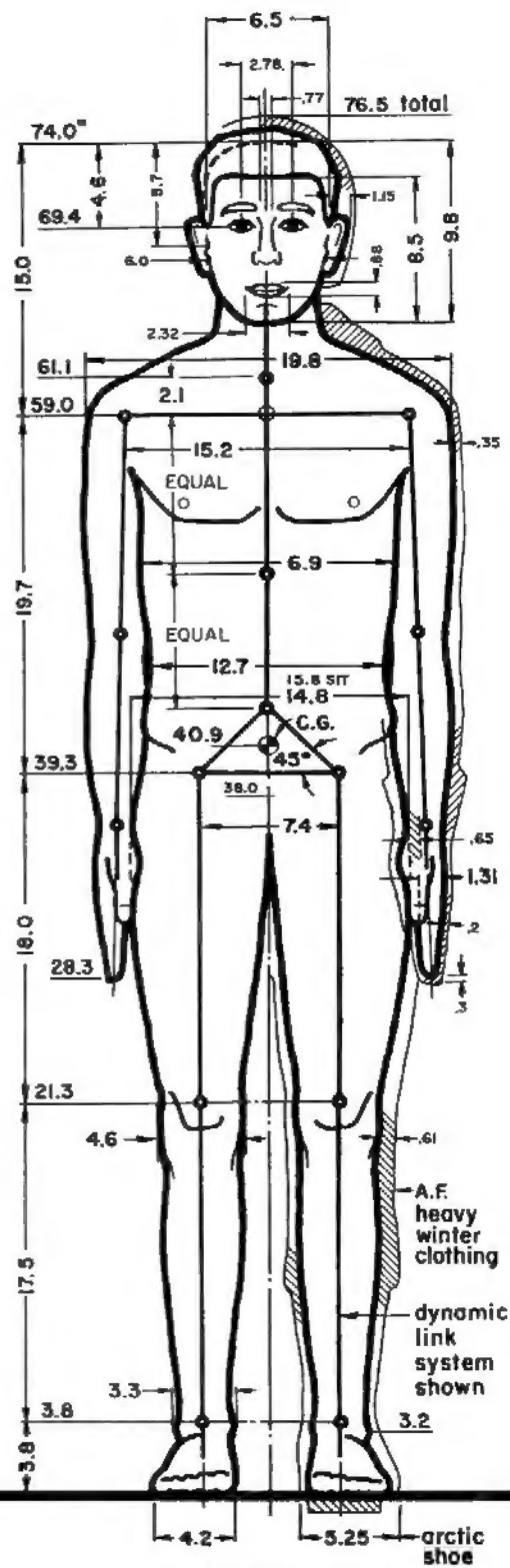
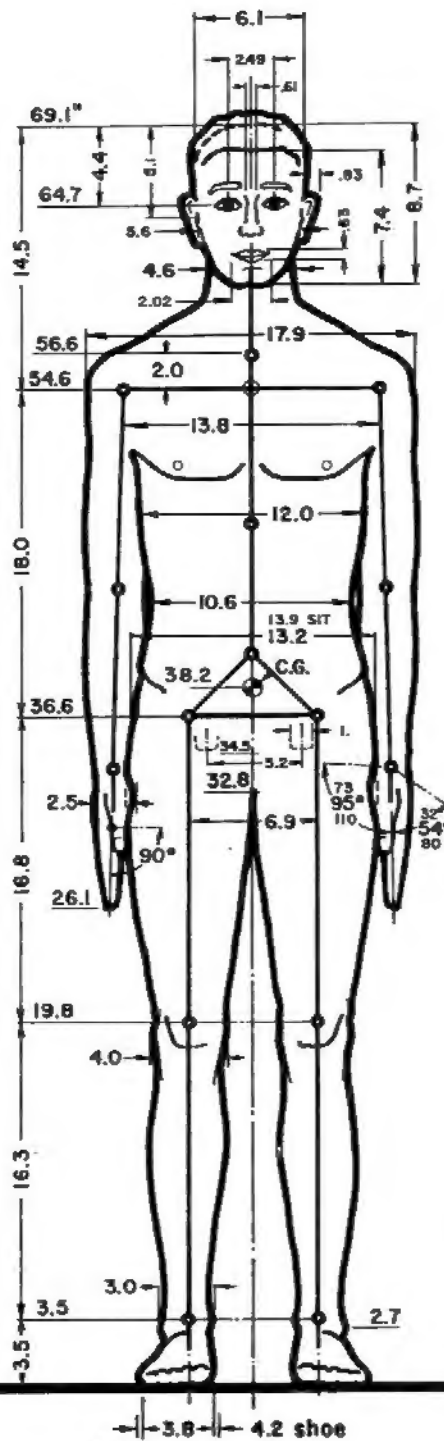
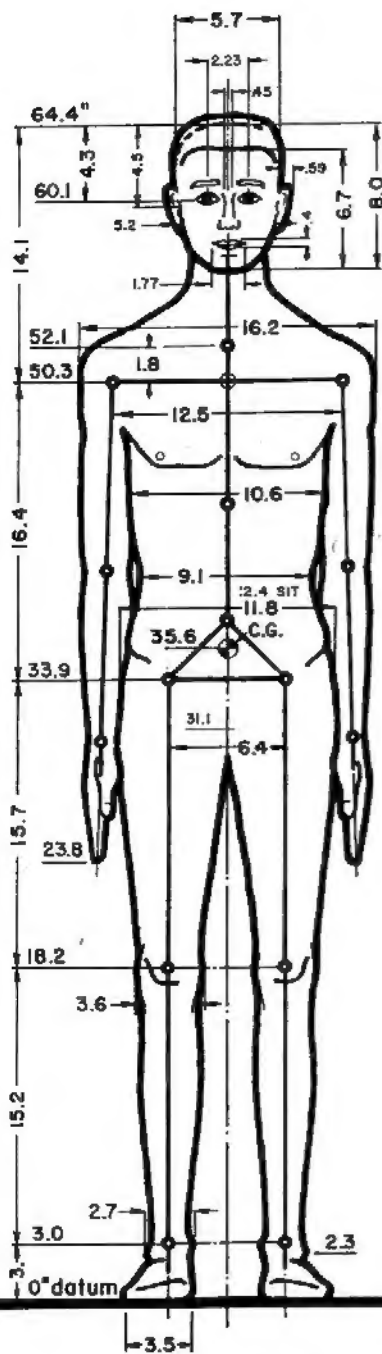
ANTHROPOMETRIC DATA — STANDING ADULT MALE

ACCOMMODATING 95% OF U.S. ADULT MALE POPULATION

2.5%tile

50.%tile

97.5%tile

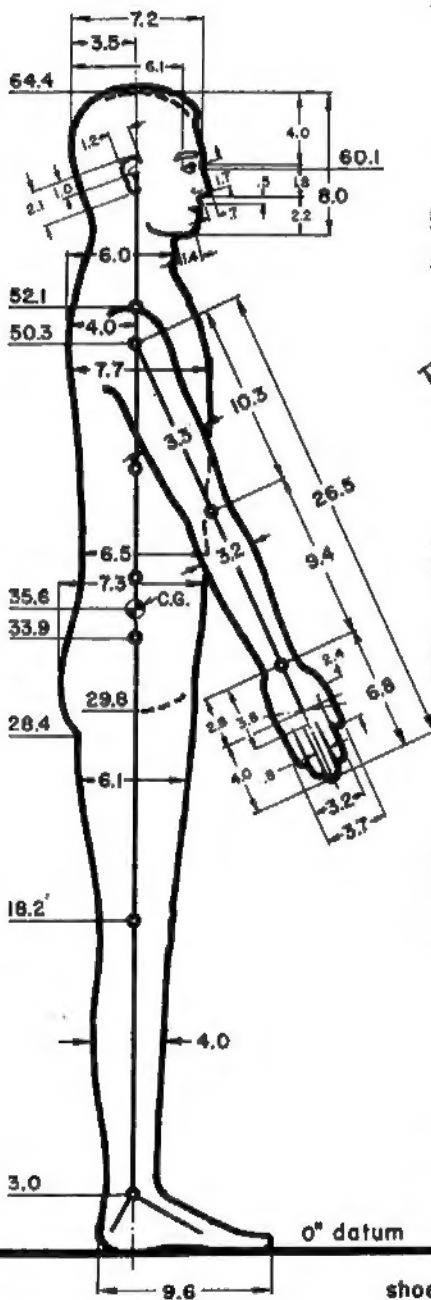


ANTHROPOMETRIC DATA - STANDING ADULT MALE
ACCOMMODATING 95% OF U.S. ADULT MALE POPULATION

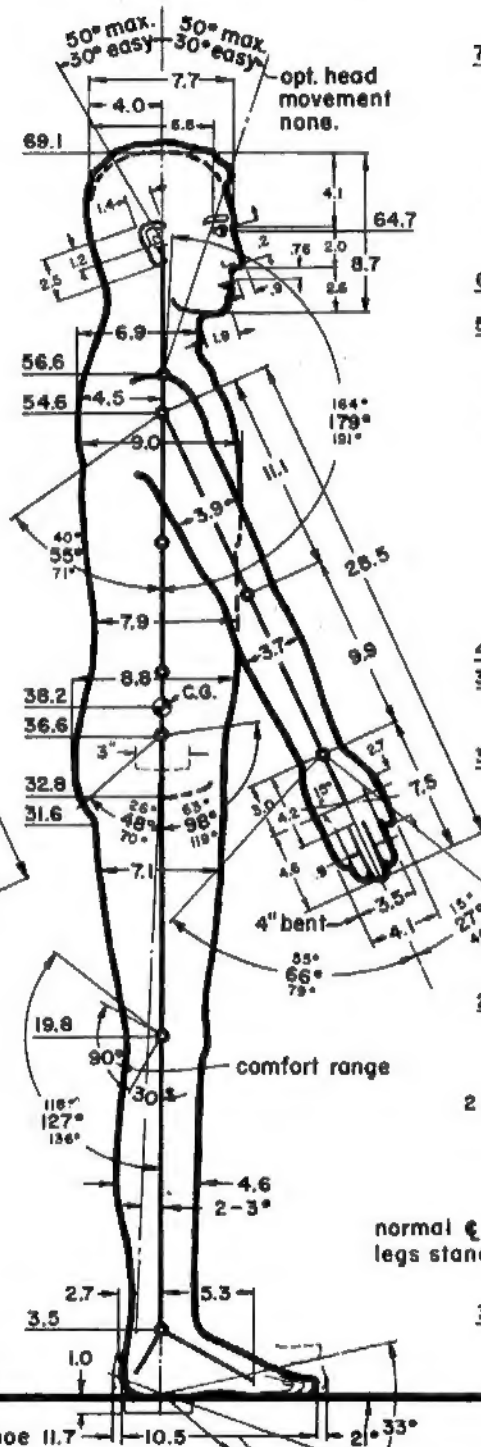
2.5 %tile

50. %tile

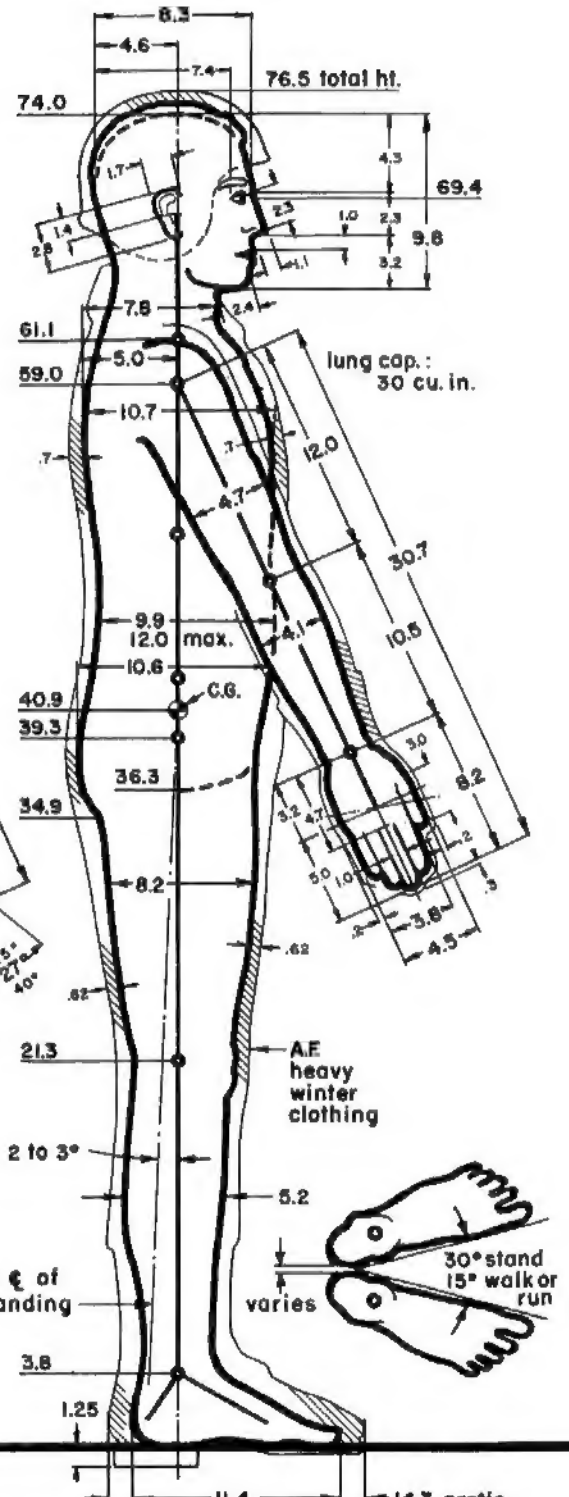
97.5 %tile



chest circ. — 34.4"
 waist circ. — 27.1"
 hip circ. — 33.7"



chest circ. — 38.7"
 waist circ. — 31.7"
 hip circ. — 37.7"



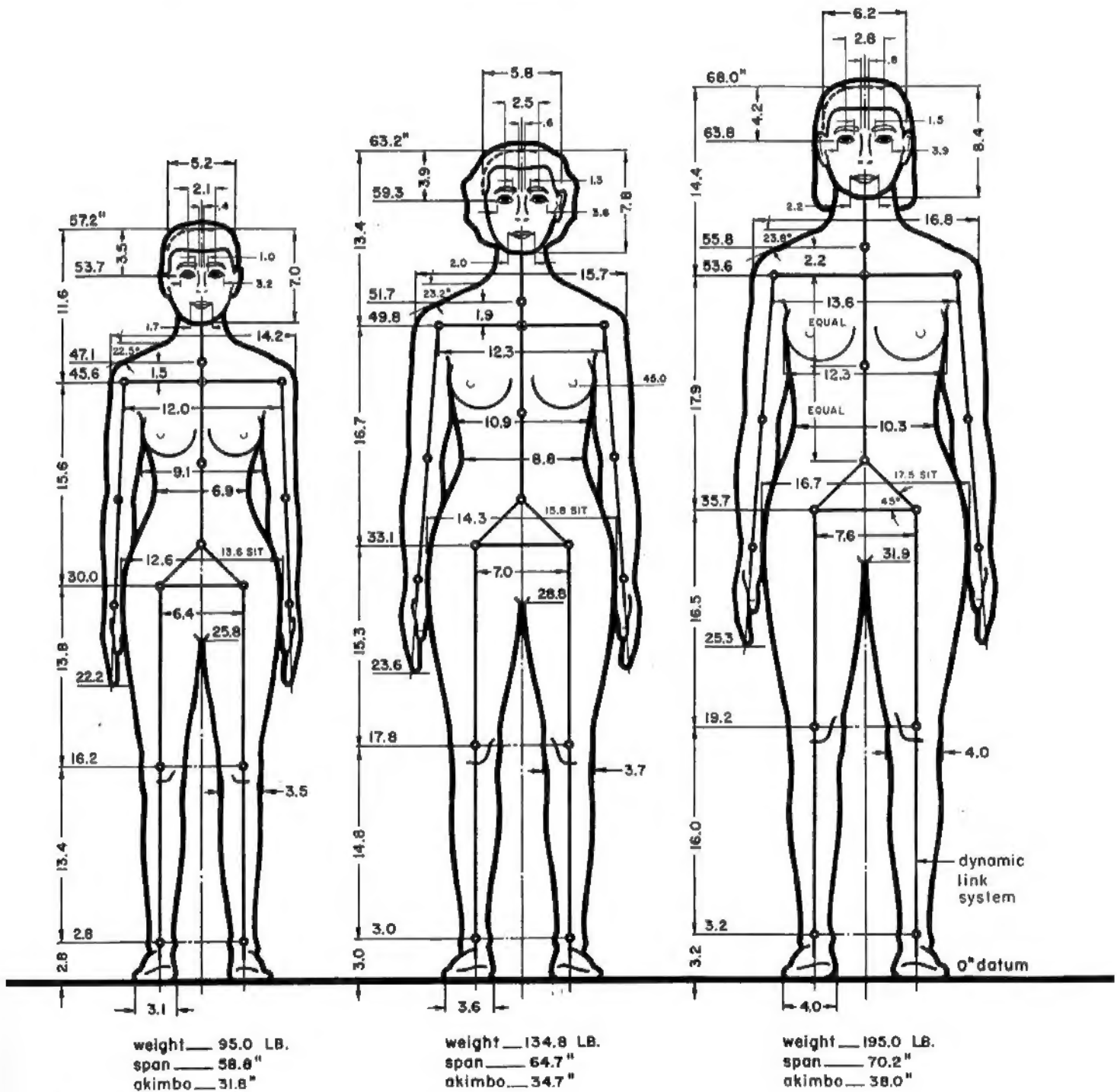
chest circ. — 43.9"
 waist circ. — 38.8"
 hip circ. — 42.8"

ANTHROPOMETRIC DATA — STANDING ADULT FEMALE
ACCOMMODATING 95 % OF U.S. ADULT FEMALE POPULATION

2.5 %tile

50. %tile

97.5 %tile



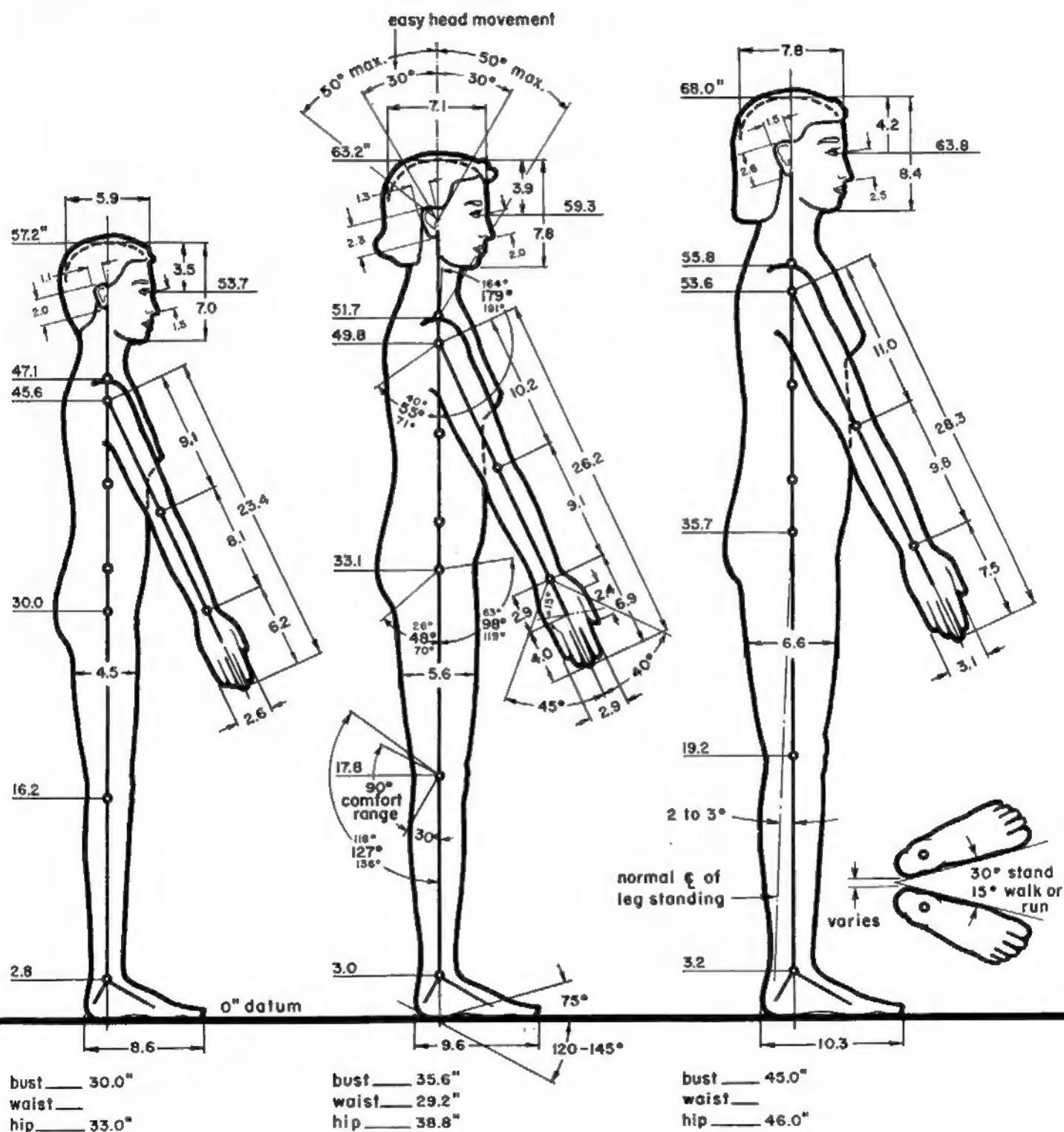
ANTHROPOMETRIC DATA — STANDING ADULT FEMALE

ACCOMMODATING 95% OF U.S. ADULT FEMALE POPULATION

2.5 %tile

50. %tile

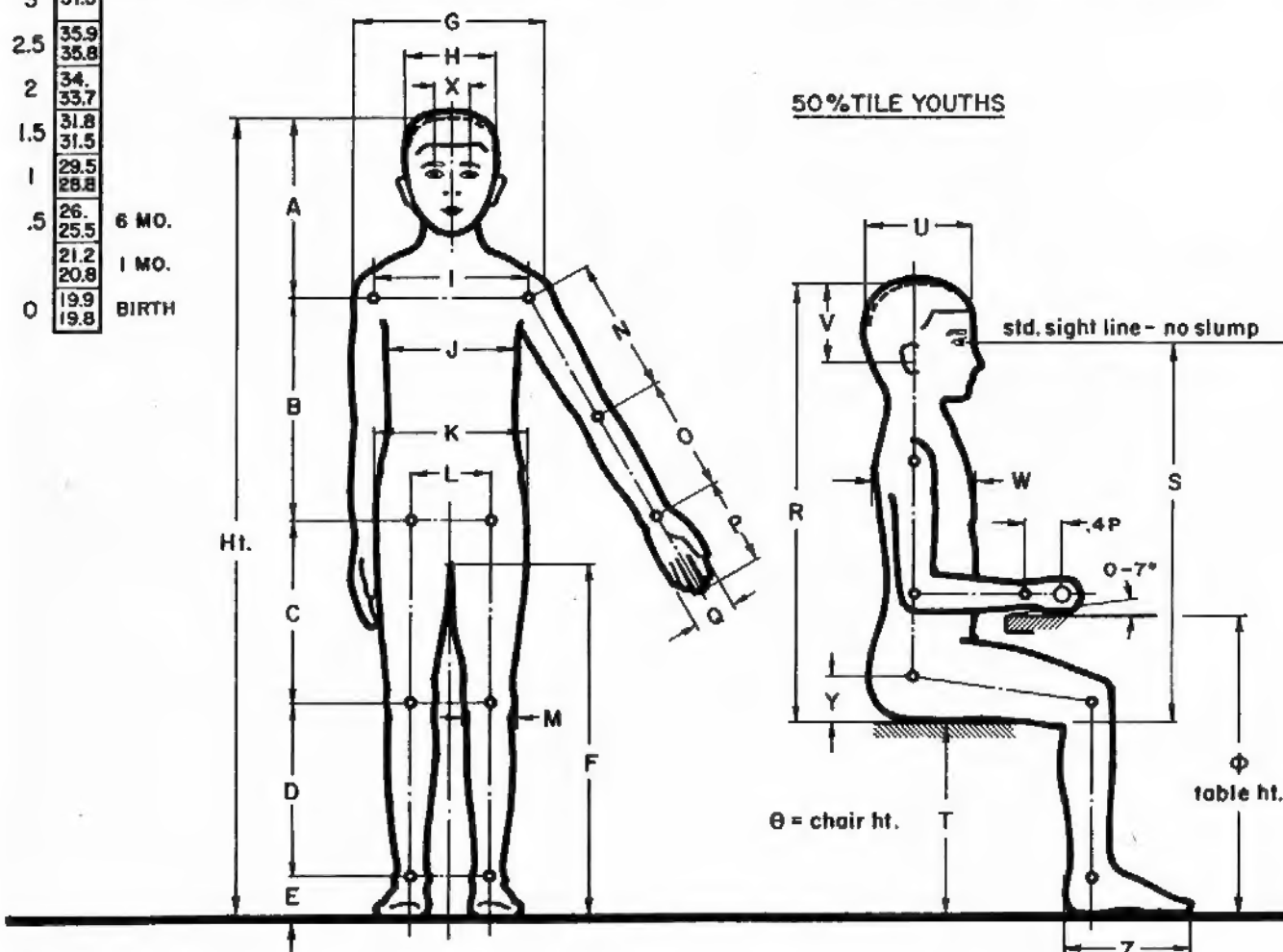
97.5 %tile



ANTHROPOMETRIC DATA - MALE AND FEMALE CHILDREN

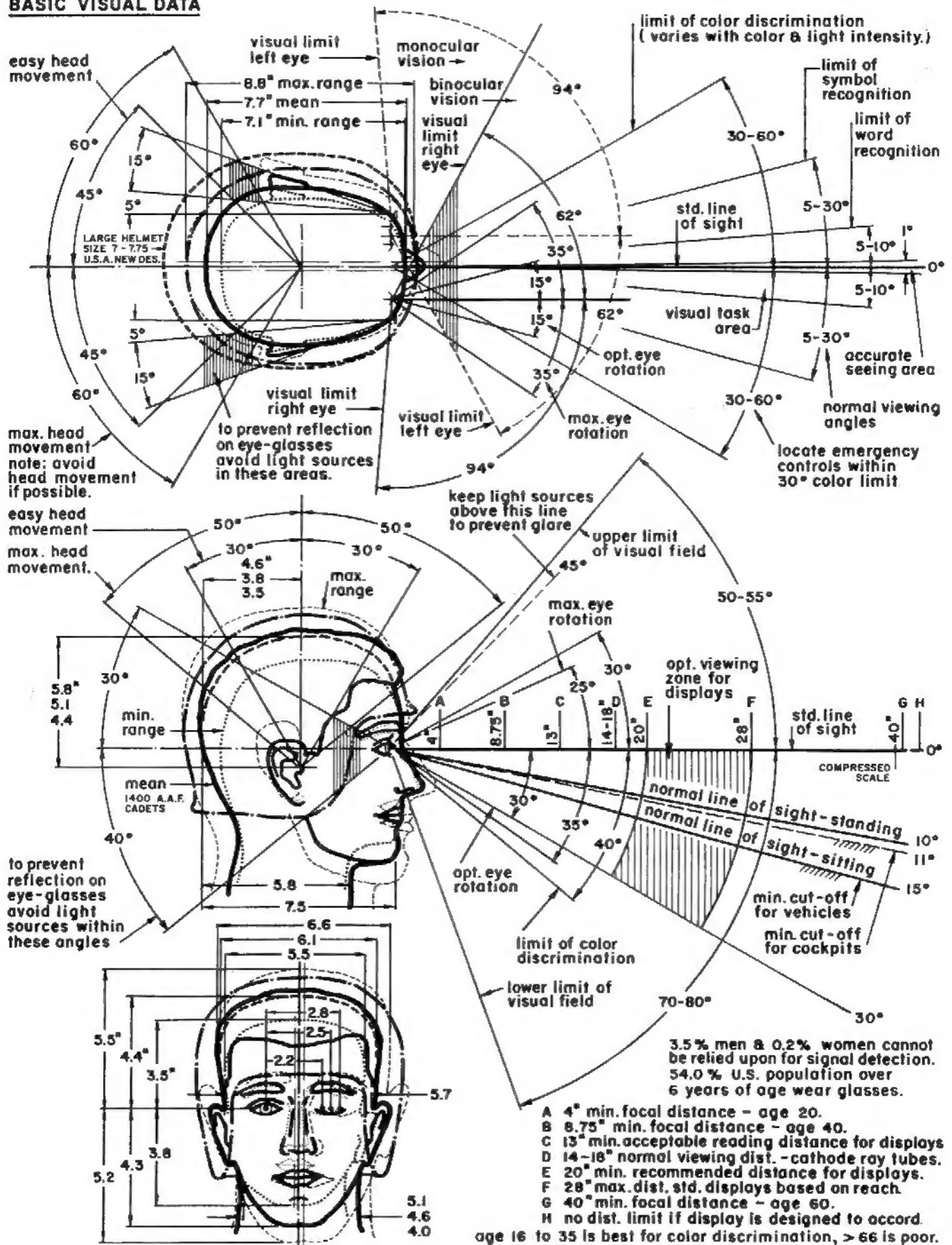
top figure in box is data for boys, lower figure is for girls, and one figure applies to both.

| Age | Ht. | Wt. | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | θ | Φ |
|-----|--------------|--------------|--------------|--------------|--------------|--------------|------------|--------------|--------------|------------|------------|--------------|--------------|------------|-------------|--------------|------------|------------|-----|--------------|--------------|--------------|------------|------------|------------|------------|------------|-------------|------|------|
| 17 | 682 636 | 138. 119. | 122 11.5 | 20.7 19.7 | 16.3 15.1 | 15.6 14.4 | 3.4 3. | 31.7 28.9 | 15.7 14.4 | 6. 5.8 | | 13.2 12.1 | 12.9 | | 3.7 | 12.3 11.5 | 10. 9.1 | 7.6 7. | | 35.3 33.5 | 31.3 29.5 | 17. 16. | 7.3 7.6 | 5.2 5. | 7.6 6.7 | | 2.9 2.8 | 10.1 9.5 | 16° | 27° |
| 16 | 673 635 | 132. 118. | 11.8 11.3 | 20.5 19.8 | 16.2 14.9 | 15.5 14.5 | 3.3 3. | 31.5 28.9 | 15.2 14.3 | 6. 5.8 | | 12.9 12.1 | 12.7 12.8 | | 3.7 | 12.2 11.7 | 9.9 9.1 | 7.6 7. | | 34.5 33.4 | 30.5 29.4 | 17. 15.5 | 7.6 7.3 | 5.2 5. | 7.4 6.9 | | 2.8 2.7 | 9.8 9.4 | | |
| 15 | 656 632 | 122. 115. | 11.1 | 20.1 19.7 | 15.9 14.9 | 15.2 14.5 | 3.3 3. | 31. 28.9 | 14.7 14.2 | 5.9 5.8 | | 12.4 11.9 | 12.3 12.7 | | 3.7 | 11.9 11.5 | 9.7 9. | 7.5 7. | | 33.4 33. | 29.4 29. | 16. 15.5 | 7.5 7.3 | 5.1 5. | 7.2 6.8 | 2.3 | 2.7 | 9.5 9.3 | 15 | 25 |
| 14 | 63. 62.3 | 109. 108. | 10.9 11. | 19.2 18.8 | 15.1 15.2 | 14.6 14.3 | 3.2 3. | 29.7 28.5 | 14.1 14. | 5.9 5.7 | 11. 11. | 11.6 11.4 | 11.6 12.3 | 5.6 3.6 | 11.4 11. | 9.3 9. | 7.2 6.9 | 3. | | 32.1 32.4 | 28.1 28.4 | 16. 15. | 7.4 7.3 | 5.1 5. | 6.9 6.7 | 2.2 2.3 | 2.6 | 9.1 | | |
| 13 | 60.5 60.6 | 96. 100. | 10. 10.2 | 17.9 19. | 15.5 14.3 | 13.9 14.1 | 3.2 3. | 28.5 28.2 | 13.5 13.6 | 5.8 5.7 | | 11. 11.1 | 11. 11.8 | | 3.5 | 10.7 11. | 8.8 8.5 | 6.8 | | 30.9 31.5 | 26.9 27.5 | 15.5 15. | 7.4 7.2 | 5.1 5. | 6.6 6.5 | 2.2 | 2.5 | 8.9 | 14 | 24 |
| 12 | 58.2 59. | 86. 90. | 10.8 10.6 | 17.1 17.9 | 13.9 14.3 | 13.3 13.5 | 3.1 3. | 27.3 27.4 | 13. 13. | 5.8 5.7 | | 10.6 10.7 | 10.6 11.2 | | 3.4 | 10.3 10.6 | 8.4 8.5 | 6.6 | | 29.9 30.3 | 25.9 26.3 | 14.5 14.7 | 7.3 7.2 | 5.1 4.9 | 6.4 6.3 | 2.2 | 2.5 | 8.6 8.5 | | |
| 11 | 56.2 56.5 | 77. 79. | 10.6 10.4 | 16.6 16.8 | 13.3 13.4 | 12.7 12.9 | 3. 3. | 26.1 26.3 | 12.6 12.4 | 5.8 5.7 | 10.5 | 10.2 10.3 | 10.1 10.5 | 5. 5. | 3.3 | 9.9 10. | 8.1 8.5 | 6.3 6.4 | 2.8 | 29.2 29.1 | 25.2 25.1 | 14. 14.4 | 7.3 7.1 | 5. 4.9 | 6.2 6. | 2.2 | 2.5 | 8.4 | 13 | 22 |
| 10 | 54.3 54.2 | 71. 70. | 10.6 10.4 | 15.9 15.9 | 12.7 12.3 | 12.2 12.3 | 2.9 2.9 | 25.1 25. | 12.3 12. | 5.8 5.6 | | 9.9 10. | 9.8 10. | | 3.2 | 9.5 | 7.8 7.7 | 6.1 | | 28.5 28.2 | 24.5 24.2 | 14. 13. | 7.3 7.1 | 5. 4.9 | 6. 5.7 | 2.2 2.1 | 2.5 | 8.3 | | |
| 9 | 52.4 52. | 64. 63. | 10.7 10.3 | 15.1 15.1 | 12.2 12.1 | 11.6 11.7 | 2.8 2.8 | 23.9 23.8 | 11.8 11.5 | 5.7 5.6 | | 9.5 9.5 | 9.1 9.5 | | 3.1 | 9.1 | 7.4 7.3 | 5.9 5.8 | | 27.7 27.4 | 23.7 23.4 | 13.5 13. | 7.2 7.1 | 5. 4.9 | 5.8 5.5 | 2.1 | 2.4 | 7.9 | 12.5 | 20.5 |
| 8 | 50.4 50. | 58. 57. | 10.6 10.2 | 14.5 14.4 | 11.5 11.1 | 11.1 11.1 | 2.7 2.7 | 22.7 22.7 | 11.4 11.1 | 5.7 5.6 | 9.2 | 9.2 | 9. 9.1 | 4.4 3. | 8.7 | 7.1 6.9 | 5.7 5.6 | 2.5 | | 27. 26.6 | 23. 22.6 | 13. 12.5 | 7.2 7. | 5. 4.9 | 5.7 5.4 | 2.1 | 2.4 | 7.7 | | |
| 7 | 48.2 47.9 | 53. 51. | 10.7 10.3 | 13.6 13.6 | 10.8 10.9 | 10.5 10.5 | 2.6 2.6 | 21.5 21.4 | 10.9 10.7 | 5.7 5.5 | | 8.8 8.8 | 8.7 8.8 | | 2.9 | 8.2 | 6.8 6.6 | 5.4 5.3 | | 26.1 25.7 | 22.1 21.7 | 12. 11.5 | 7.1 6.9 | 5. 4.8 | 5.5 5.4 | 2.1 | 2.4 | 7.4 | 11 | 18.5 |
| 6 | 46.1 45.8 | 48. 46. | 10.8 10.4 | 12.7 12.7 | 10.3 10.3 | 9.8 9.9 | 2.5 2.5 | 20.2 20.2 | 10.4 10.2 | 5.6 5.5 | 8.5 | 8.5 | 8.3 8.4 | 4.1 2.8 | 7.6 | 6.1 6.2 | 5.1 5.1 | 2.3 | | 25.4 25. | 21.4 21. | 11.6 11. | 7.1 6.8 | 4.9 4.8 | 5.5 5.3 | 2. | 2.4 | 7. | | |
| 5 | 43.9 43.6 | 43. 42. | 10. 9.7 | 12.7 12.7 | 9.6 9.6 | 9.2 9.2 | 2.4 2.4 | 18.9 18.8 | 10.1 9.8 | 5.6 5.4 | | 8.2 8.1 | 8. 8.1 | | 2.7 | 7. | 6. 5.9 | 4.9 4.8 | | 24.5 24.3 | 20.5 20.3 | 11. 10. | 7. 6.8 | 4.9 4.8 | 5.4 5.2 | 2. | 2.3 | 6.8 6.6 | 10 | 17.5 |
| 4 | 40.9 37. | 38. 37. | 10.4 10.5 | 11.1 10.9 | 8.8 8.5 | 8.4 8.5 | 2.2 2.2 | 17.2 17.2 | 9.7 9.4 | 5.6 5.4 | | 7.9 7.7 | 7.4 7.7 | | 2.7 | 6.4 | 5.6 5.4 | 4.7 4.6 | | 23.5 23.1 | 19.5 19.1 | 9.5 10. | 6.9 6.7 | 4.9 4.8 | 5.2 5.2 | 1.9 | 2.3 | 6.6 6.5 | | |



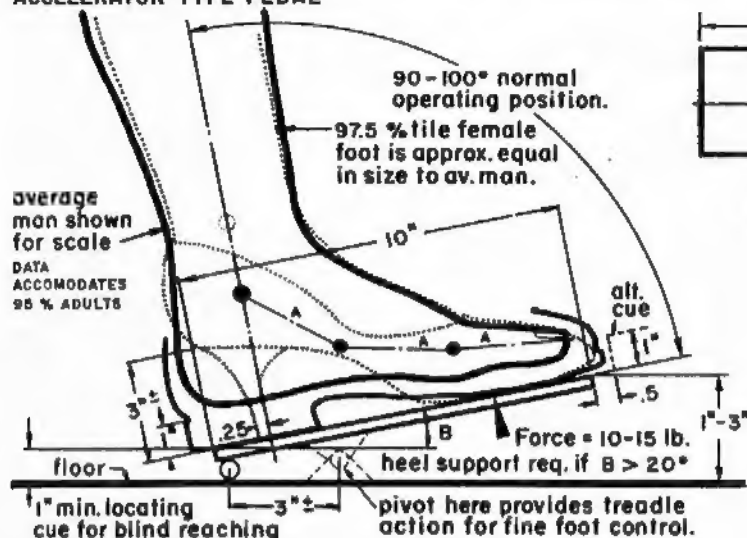
50%TILE YOUTHS

BASIC VISUAL DATA

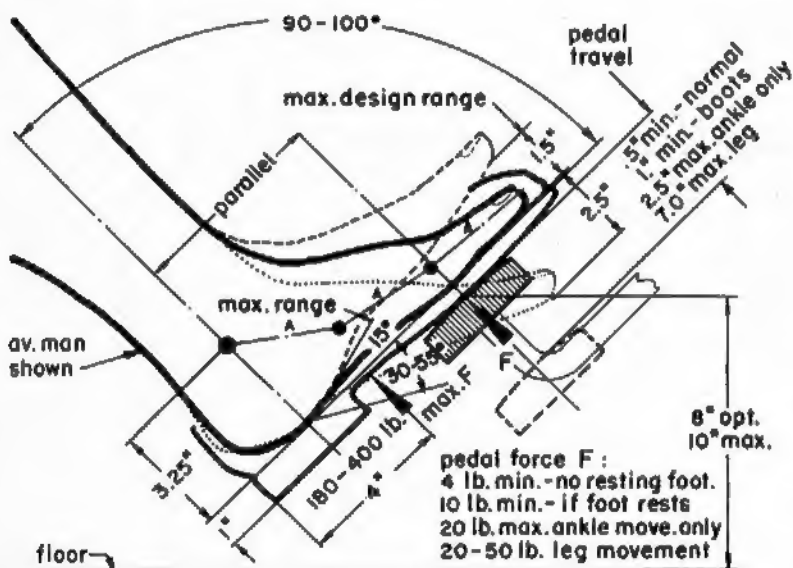


FOOT MEASUREMENTS AND BASIC FOOT CONTROLS

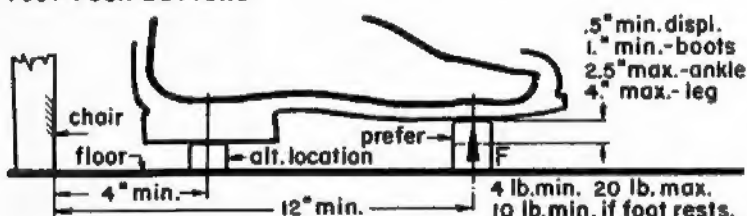
ACCELERATOR TYPE PEDAL



BRAKE TYPE PEDAL

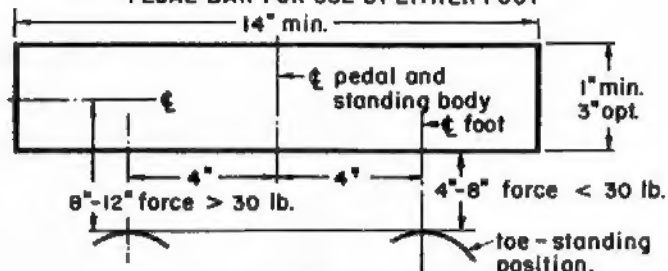


FOOT PUSH BUTTONS



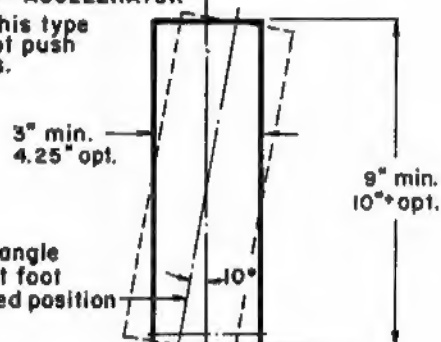
| | MEN | | | WOMEN | | |
|---------------|-------|------|--------|-------|------|--------|
| percentiles → | 2.5 % | 50 % | 97.5 % | 2.5 % | 50 % | 97.5 % |
| foot length | 9.6" | 10.5 | 11.4 | 8.6 | 9.6 | 10.3 |
| foot width | 3.5" | 3.8 | 4.2 | 3.1 | 3.6 | 4.0 |
| instep length | 6.9" | 7.6 | 8.3 | | | |
| heel width | 2.3" | 2.6 | 2.9 | | | |
| ankle width | 2.7" | 3.0 | 3.3 | | | |

PEDAL BAR FOR USE BY EITHER FOOT

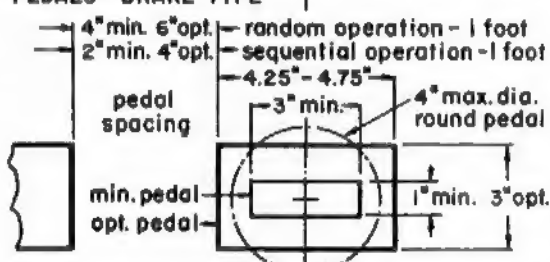


PEDALS - ACCELERATOR

prefer this type
over foot push
buttons.



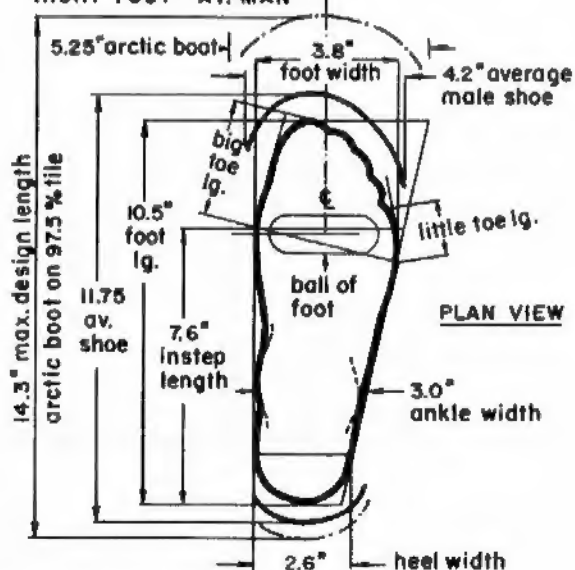
PEDALS - BRAKE TYPE



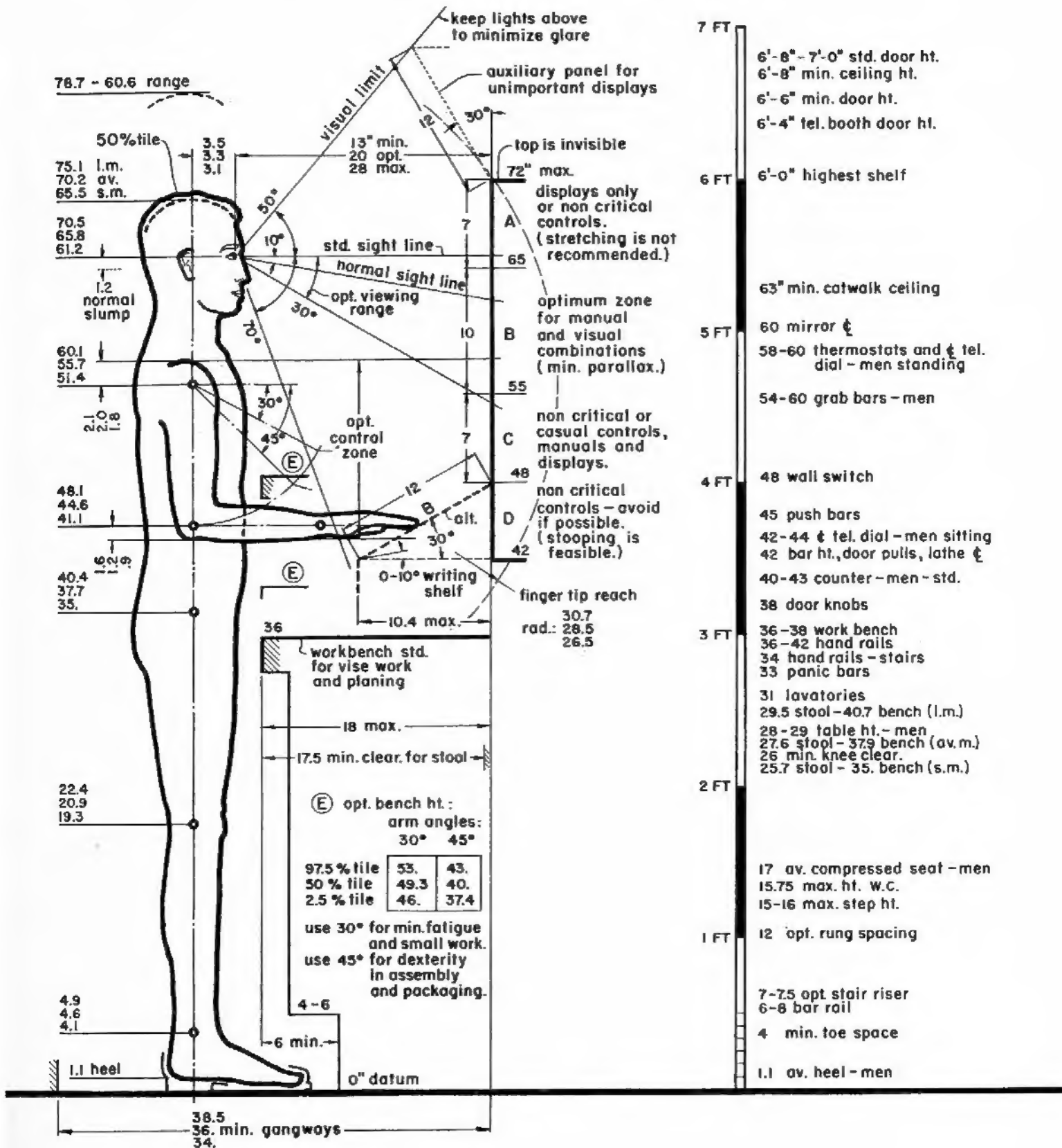
FOOT PUSH BUTTONS

prefer ball of foot to
 heel operation.
 provide snap feel.
 use only if both hands are occupied, foot buttons
 are susceptible to accidental activation.

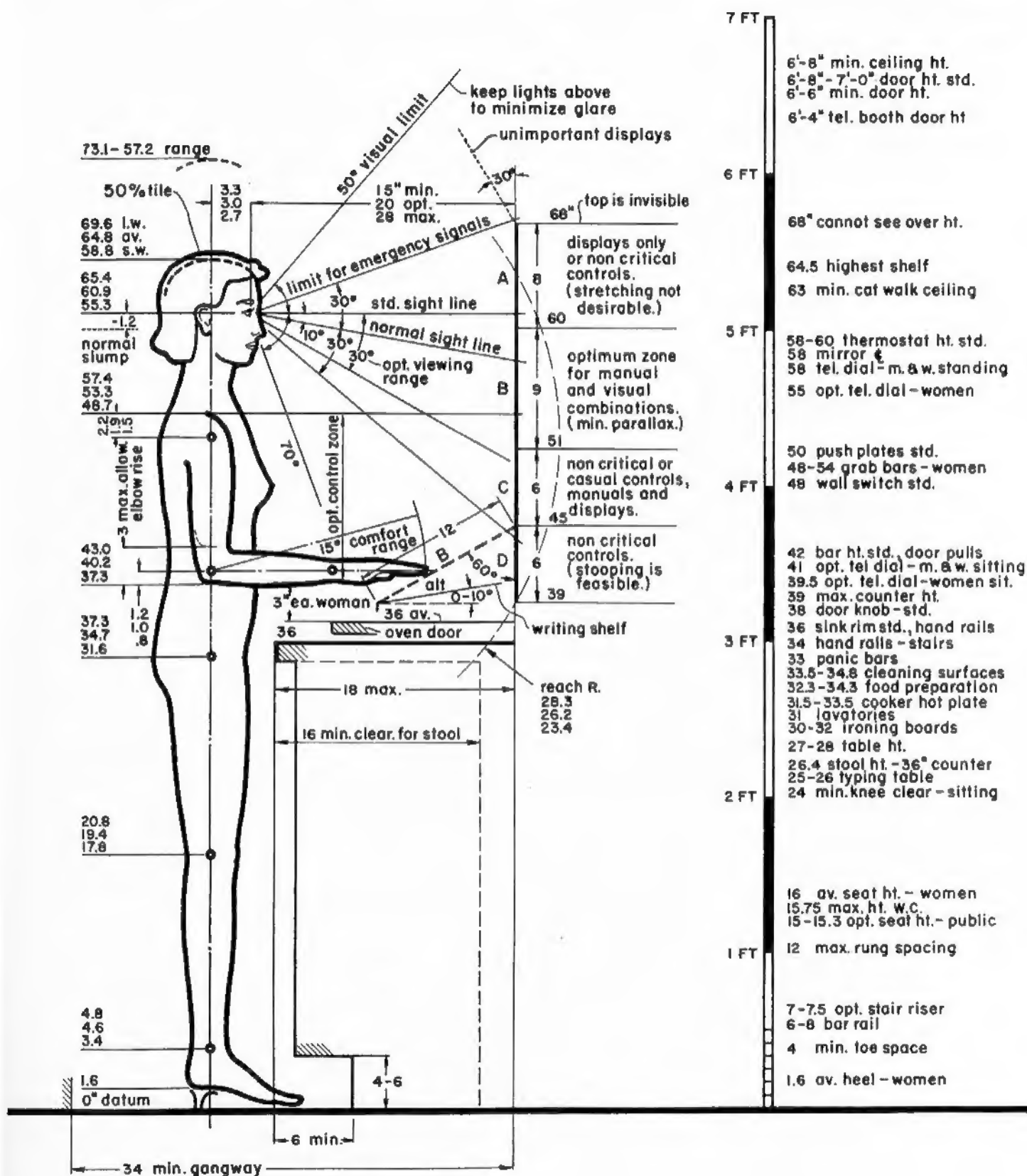
RIGHT FOOT - AV. MAN



ANTHROPOMETRIC DATA — ADULT MALE STANDING AT CONTROL BOARD



ANTHROPOMETRIC DATA — ADULT FEMALE STANDING AT CONTROL BOARD





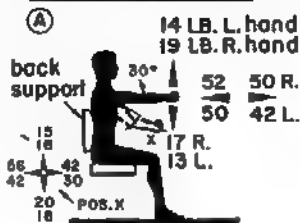
* leg angle 105-110° for max. pedal pressure 0-50 lb.
120° min. " " " " 50-100 lb.

HUMAN STRENGTH

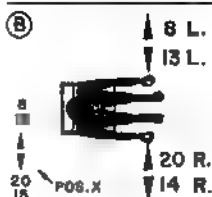
(for short durations)

strength correction factors:
 X 0.9 left hand and arm
 X 0.84 hand-age 60
 X 0.5 arm & leg-age 60
 X 0.72 women

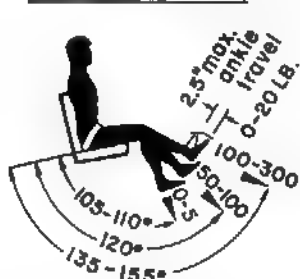
ARM FORCES SITTING



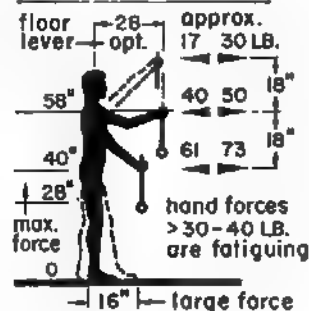
ARM FORCES SITTING



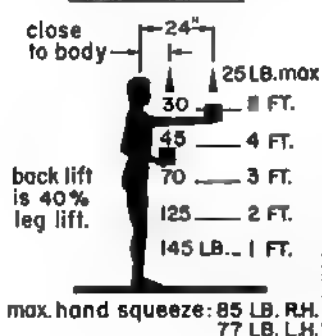
LEG FORCES SITTING



ARM FORCES STANDING



LIFTING FORCES

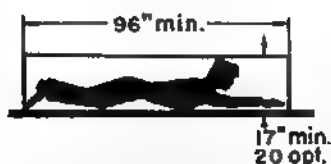


BODY CLEARANCES

SUPINE



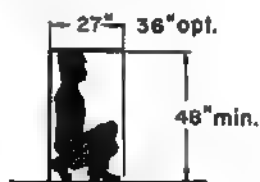
PRONE



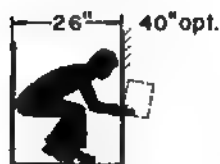
CRAWL



SQUAT



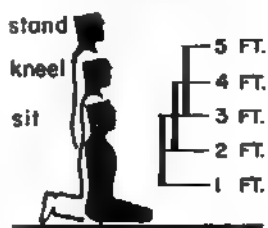
STOOP



KNEEL



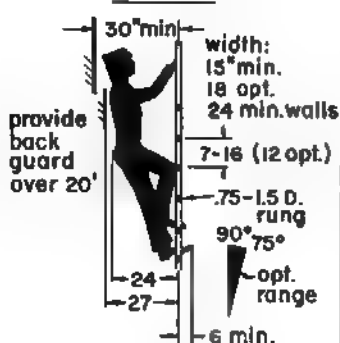
MAINTENANCE REACH LEVELS



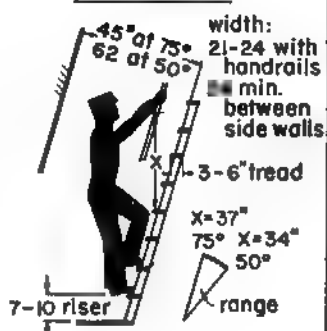
CLIMBING DATA

all data on this sheet
 accommodates
 95% U.S.A. adult males

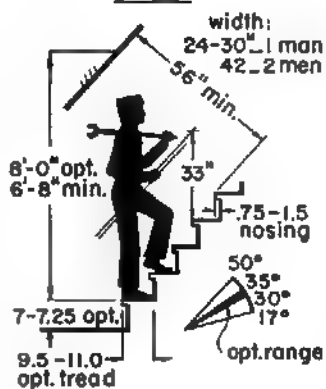
LADDERS



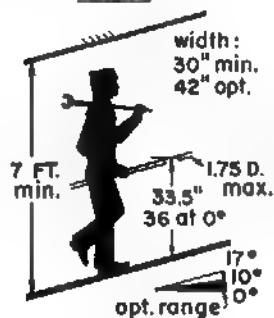
STEP LADDERS



STAIRS



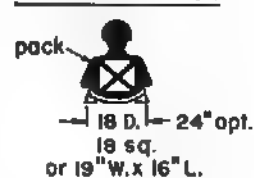
RAMP



INGRESS & EGRESS

min. entries:
 13-18" difficult — 1 man
 18-24 fair — 1 man
 24-36 good — 1 man
 > 36 good — 2 men

MIN. ESCAPE HATCH



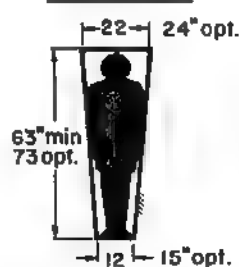
MIN. SIDE HATCH



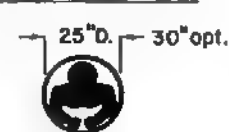
MIN. BELLY HATCH



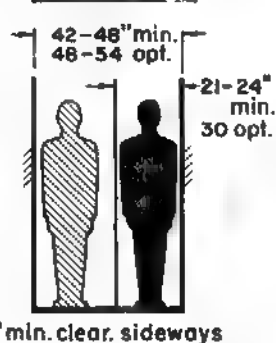
MIN. CATWALK



MIN. CRAWL THRU PIPE



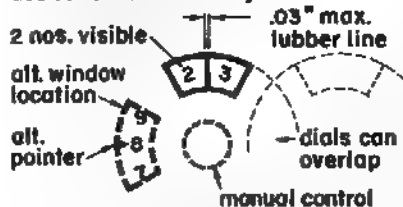
PASSAGE WAYS



BASIC DISPLAY DATA

OPEN WINDOW DIALS

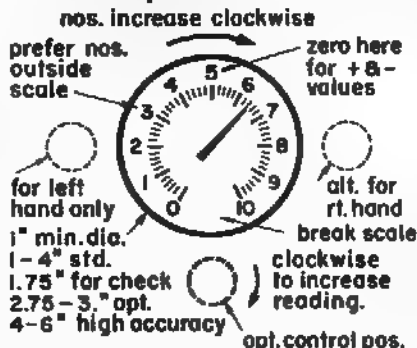
99 % accuracy in reading
use for exact data only.



RULE 1. numbers increase clockwise
RULE 2. associated control to move in same direction as dial.
RULE 3. move control clockwise to increase.
not recommended with manual control

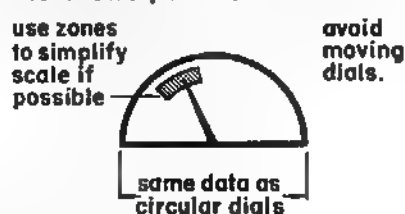
CIRCULAR DIALS

89 % accuracy in reading
use for exact, relative or check data.



SEMI-CIRCULAR DIALS

83 % accuracy in reading
use for exact, relative or check data.

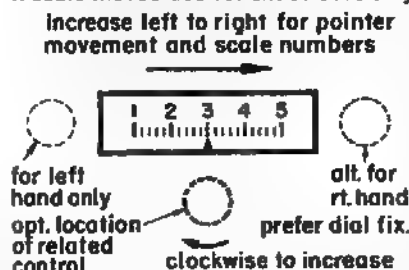


avoid distracting trademarks on all dials.

nos. & spacing of scale markings ultimately determines dial sizes.

HORIZONTAL SCALES

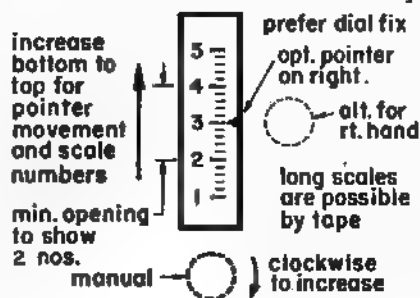
72 % accuracy in reading
use for exact, relative or check data.
if scale moves use for exact data only.



recommend manual & moving pointer

VERTICAL SCALES

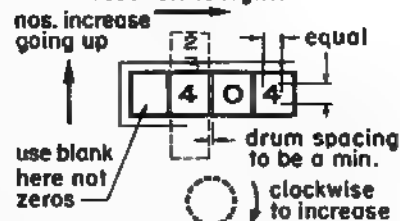
64 % accuracy in reading
use for exact, relative or check data.
if scale moves use for exact data only.



recommend manual & moving pointer

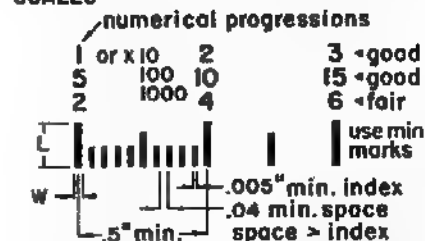
COUNTERS

99 % accuracy in reading
use for exact data only.
rate: 2 nos. per sec. max.
read left to right.



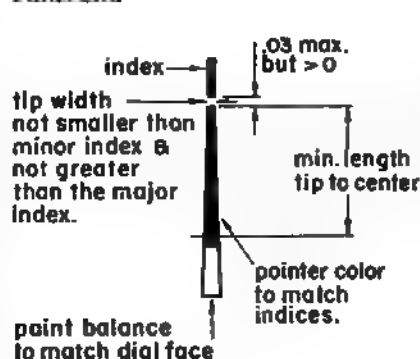
frame to be same color as drums
minimize frame shadows
least count nos. to snap into position

SCALES



Average data: L (in.) W (in.)
major index..... .095 S .015 S
intermediate index..... .069 S .013 S
minor index..... .043 S .011 S
S equals viewing distance in feet

POINTERS

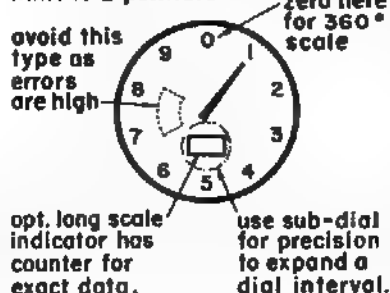


NUMERALS AND LETTERS

all nos. & letters to read vertically.
prefer titles on single line.
futura or U.S.A.F. std. cond. if req.
stroke ratio: 1 : 6 black on white
1 : 8 white on black
background contrast: 75 - 80 % +
Min. light = 1 ft. L. min. (in.) max. (in.)
critical markings..... .043 S .086 S
instructions..... .021 S .086 S
moving markers..... .051 S .086 S
S equals viewing distance in feet

MULTI-REVOLUTION DIALS

avoid multi-pointer dials
errors in reading are high
limit to 2 pointers



SIGNAL LIGHTS

label on top or within.
min. space .75
or rect. .75
dark background increases eff.
flashing signals
brightness 2 x .5" signal
flash rate: 3-5 per sec.
on time: .05 sec. min.
off time > on
use green for satisfactory.
use red for unsatisfactory.
use amber for impending unsatisfactory.

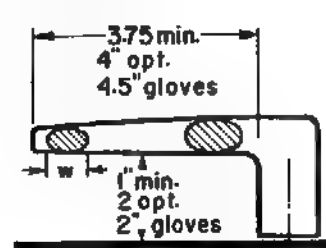
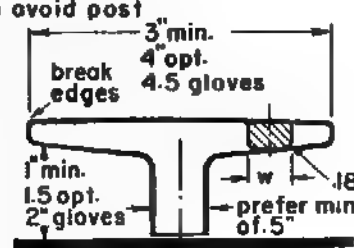
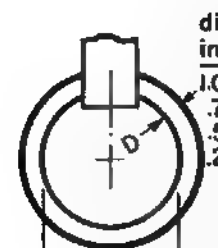
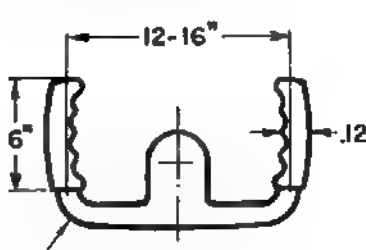
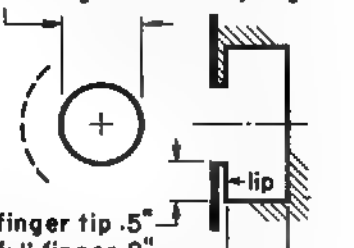
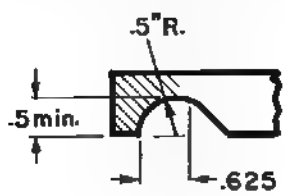
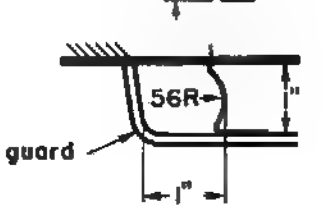
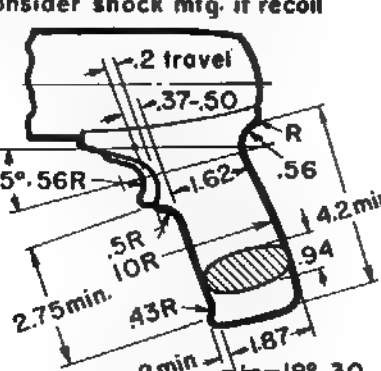
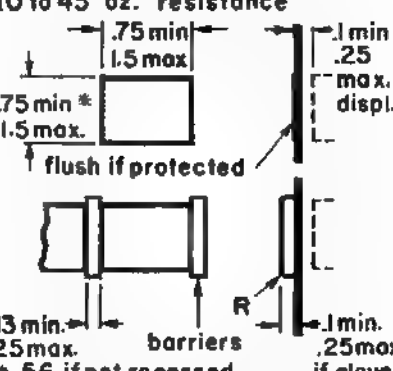
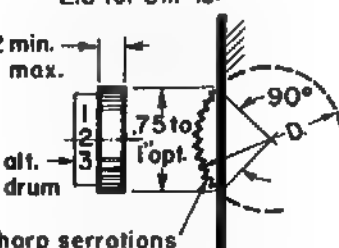
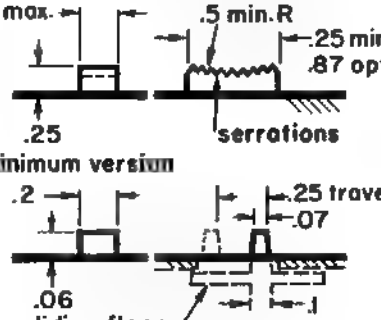
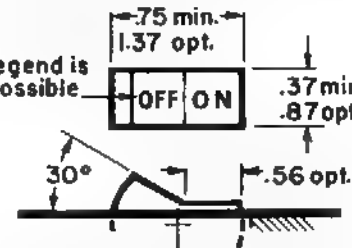
DIAL ARRAY

order of sequence
consider green safe zones
min. 3
min. 4
opt. pointer position for check reading
2 nd. choice
use std. sizes
consider unity & symmetry.
manuals to have relative positions

BASIC CONTROL DATA

| | | |
|--|--|---|
| <p>BALL GRIPS</p> <p>fingers .5 min. hands 1.5 opt. 2 max. 10 lb. pull 20 lb. push 30 lb. max. 2-4" 1 hand 4-5" 2 hands 90° max. lever make L max. consider wrist support 2" min. displ. for L=6" 14 max. fwd. & aft. displ. 38 max. laterally</p> | <p>CYLINDRICAL GRIPS</p> <p>lever handles</p> <p>1" min. 1.75 max. 3" min. no max. avoid finger notching</p> <p>grab bars and lifting handles</p> <p>3.8 min. 4.5 opt. 1.6 min. 2 finger 3.75 min. 0-40 lb. .875 min. 0-100 lb. 1.5" min. 2.0 opt. also side clear.</p> | <p>FLUSH PULLS for door, drawers etc.</p> <p>1.25" min. 1.5 opt. 4R. 1.1 min. 1.5 opt. 25 4R. 1.7 min. 1.9 opt. 15° opening width: 3.5" min. 4.0 opt.</p> |
| <p>ROTARY KNOBS</p> <p>use 1" for non critical settings. & 2-4" for critical settings.</p> <p>25" min. 3.75" min. 25 low force 4.0 max. typ. serrations: .08" dia. .22 space. .05 deep 1 hand 1-2" 2 hands 3-5" .5" min. .875-1" opt. 5° skirt torque: 4.5 in.-oz. max. < 1" dia. 6.0 in.-oz. max. > 1" dia.</p> | <p>BAR KNOBS</p> <p>15° min. - visual 30° min. - non visual 40° max. for opt. perform. 90° max. if req. mech. displ. 25 min. 1" min. no max. 1" max. 5° min. 3.0 max. resistance: 12 oz. min. - 48 oz. max. no. of positions: 24 max. use round knob for rotation > 180°</p> | <p>GANGED KNOBS</p> <p>sequential order</p> <p>1 2 3 assoc. displays 3" opt. 1.75 opt. 5° opt. serrate or knurl 5° .75 opt. .75 opt. 25 min.</p> |
| <p>HIGH TORQUE KNOBS for 5 finger grab</p> <p>2" min. 4" max. profiles for max. force: < 90° rotate. > 90° rotate. avoid 3 5 and 6 prongs. .37 min. R. 1" min. space. finger flutes. .5" to 1" 1" min. clear. torque: 50 in. lb. max.</p> | <p>CRANKS for rotations more than 90°</p> <p>1.5" fingers 3.75 hand R. taper avoids hand slip handle should rotate 5 fingers 1.0 hand .5" min. radius 20.0" max. - heavy load 4.5 max. - min. load, high speed resistance: 5 lb. max. < 3.5" rad. 10 lb. max. 5"-8" rad.</p> | <p>HAND WHEELS</p> <p>7" min. 21" max. prefer min. no. spokes down up .75 min. 2.0 max. 90° - 120° rotation to avoid shifting hands. resistance: 5 lb. min. 30 lb. max. - 1 hand 50 lb. max. - 2 hands</p> |
| <p>PUSH BUTTONS</p> <p>.625 min. 1 finger .75-1.25 2 fingers 1.25-2.0 .93 min. recess dia. 3.75 min. dia. 5-1" opt. 1.5-2 palm 5-2 foot .05 R. rect. for titles 25 lb. min. force 1-3 lb. opt. 31 lb. max. 4-20 lb. - foot 10-20 lb. if foot rests on it. 1.25 min. - 1.0 max. defl. - no gloves .25-2.0 gloves .5-2.0 shoes 1.0-4.0 boots * not required</p> | <p>PUSH BUTTONS - TOUCH SYSTEMS prefer vertical buttons, fig. B</p> <p>A 11° opt. 20° max. B 4-11 oz. .438 max. 5" wide .187 defl. .75 .312 min. clear. operation rate: 4.1-5.3 per sec.</p> | <p>TOGGLE SWITCHES</p> <p>prefer ON OFF ON OFF 1.25 min. 1.0 max. .875 min. 4"-6" blind reach. 40° min. 60° opt. 120° max. 10 oz. min. 40 oz. max. 5" min. 2.0 max. 1.5 min. - gloves prefer bat shape prefer 2 settings to 3 or 4</p> |

BASIC CONTROL DATA, PART 2

| <p>OPEN OR J HANDLE</p>  <p>3.75 min. 4" opt. 4.5" gloves</p> <p>1" min. 2" opt. 2" gloves</p> <p>w = .5" min. for over 40 lb side clear: 2" to wall</p> | <p>T HANDLE note: prefer J or stirrup handles to avoid post</p>  <p>3" min. 4" opt. 4.5" gloves</p> <p>break edges</p> <p>1" min. 1.5 opt. 2" gloves</p> <p>prefer min. of .5"</p> <p>w = .125 up to 15 lb w = .5" min. for over 40 lb side clear: 2" to wall</p> | <p>RING PULLS</p>  <table border="1"> <thead> <tr> <th>dia. in.</th> <th>pull lbs.</th> </tr> </thead> <tbody> <tr> <td>1.0</td> <td>40</td> </tr> <tr> <td>.75</td> <td>20-40</td> </tr> <tr> <td>.5</td> <td>15-20</td> </tr> <tr> <td>.25</td> <td>0-15</td> </tr> </tbody> </table> <p>2.75 min. hand 2.25 min. 3 fingers 1.5 min. 2 fingers 1.0 min. 1 finger</p> | dia. in. | pull lbs. | 1.0 | 40 | .75 | 20-40 | .5 | 15-20 | .25 | 0-15 |
|--|---|--|----------|-----------|-----|----|-----|-------|----|-------|-----|------|
| dia. in. | pull lbs. | | | | | | | | | | | |
| 1.0 | 40 | | | | | | | | | | | |
| .75 | 20-40 | | | | | | | | | | | |
| .5 | 15-20 | | | | | | | | | | | |
| .25 | 0-15 | | | | | | | | | | | |
| <p>AIRCRAFT HAND WHEEL</p>  <p>12-16"</p> <p>6"</p> <p>curve to prevent catching of knees</p> | <p>FINGER RECESS PULL</p> <p>finger tip .75 min., 1" gloves full finger: 1.25 min., 1.5 gloves</p>  <p>5" R.</p> <p>5" min. full finger 2"</p> <p>finger tip: 5" min., .75 gloves full finger: 2" min., 2" gloves</p> | <p>FINGER TIP RECESSED PULL</p>  <p>5" R.</p> <p>length of recess 3.5 for 4 fingers</p> | | | | | | | | | | |
| <p>TRIGGERS</p> <p>.25 min. - .5 max.</p> <p>break edges</p> <p>.38 R.</p>  <p>56 R.</p> <p>guard</p> | <p>PISTOL GRIP FOR TOOLS consider shock mtg. if recoil</p>  <p>.2 travel .37-.50 15" .56 R. 1.62 .56 4.2 min. .94 1.87 18°-30° 2 min. 43 R. 2.75 min. 10 R. .5 R.</p> | <p>LEGEND SWITCHES 10 to 45 oz. resistance</p>  <p>.75 min. 1.5 max.</p> <p>flush if protected</p> <p>.13 min. .25 max. barriers</p> <p>.1 min. .25 max. if gloves</p> | | | | | | | | | | |
| <p>THUMB WHEELS dia. is 1.5 for 1 in.-lb. 2.5 for 3 in.-lb.</p>  <p>12 min. 5 max.</p> <p>1.25 to 1" opt.</p> <p>90°</p> <p>alt. drum</p> <p>sharp serrations</p> <p>note: avoid markings on wheel which are obscured by fingers</p> | <p>SLIDE SWITCHES</p> <p>.2 min. .5 max.</p> <p>concave flat or convex</p> <p>.5 min. R.</p> <p>.25 min. .87 opt.</p>  <p>.25</p> <p>minimum version</p> <p>.2</p> <p>.06 sliding flags</p> <p>.07</p> <p>.25 travel</p> <p>serrations</p> | <p>ROCKER SWITCHES</p>  <p>.75 min. 1.37 opt.</p> <p>legend is possible</p> <p>OFF ON</p> <p>.37 min. .87 opt.</p> <p>30°</p> <p>.56 opt.</p> <p>rockers can replace toggles they give a visual cue of operation serration on surface not required</p> | | | | | | | | | | |

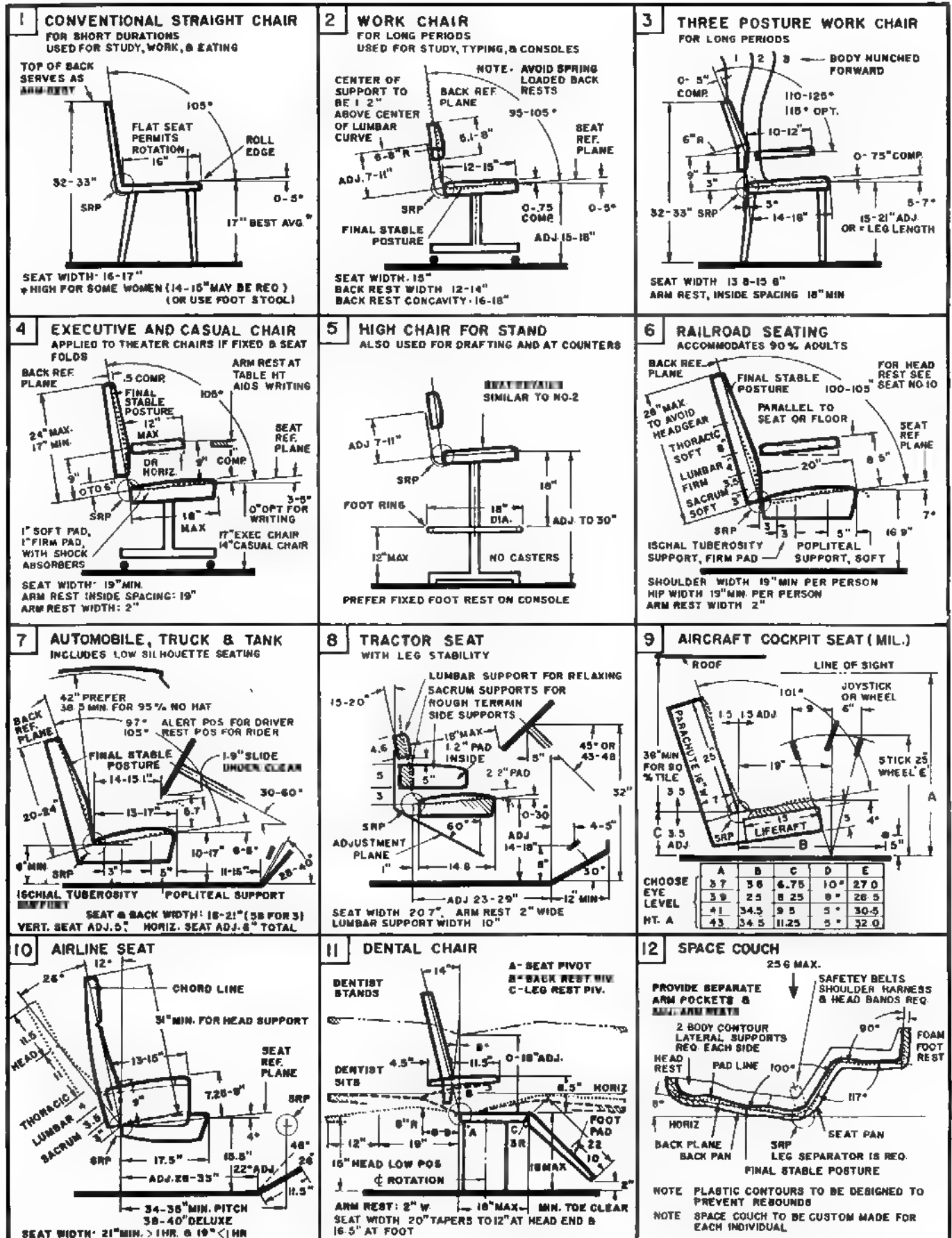


ACCESS OPENINGS

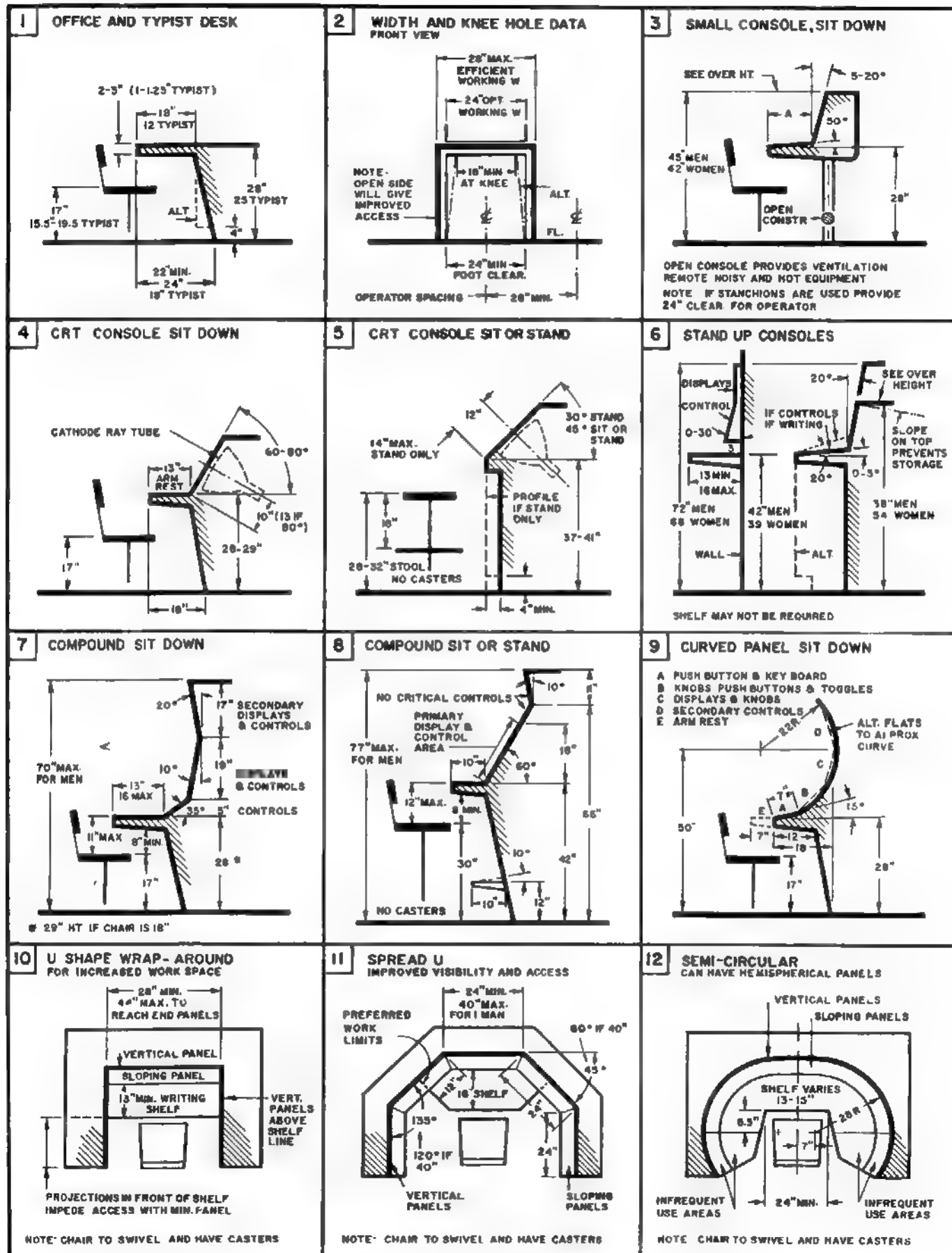
*INDICATES DESCRIPTION APPLIES TO DATA TABULATED BELOW

| HANDS | | | | | BODY | | | | |
|---------|--|------------------------|--------------------------|-----------------------------|------|---------------------------|-------------------------------|----------------------------|-----------------------------|
| | empty hand held flat | * bare 4x2.25" | * work gloves 6x3" | * arctic gloves 6.5 x 4" | | manhole | work clothes 22.8 | — | space suit 36"D |
| | min. to wrist | 3.5 sq. | 5.5 sq. | 6. sq. | | Crawl thru pipe | *min.avg. clothes 25" I.O. | *prefer 30" I.O. | *arctic clothes 32" I.O. |
| | clenched hand | 3.5 x 3 | 4.5 x 6 | 7 x 8.5 | | ceiling and floor hatch | 18"D | 22"D | 32"D |
| | inserting 1" object to wrist | 3.75 D | 6. D | 7. D | | wall hatch | 18 x 15 | 22 x 20 | 32 x 24 |
| | using pliers screw driver | 5.2 x 4.5 4.2 x 4.6 | — | — | | side hatch incl. pack | 20 x 32 | — | — |
| | one hand passing object | L = 4" A+B=1.75 | L = 6" A+B = 2.5 | L = 6.5" A+B=2.5 | | belly hatch incl. pack | 20 x 29 | — | — |
| | two hands straight ahead reach = 6-25" | H=4 add for vision | H=6 add for vision | H=6.5 add for vision | | crawl thru | 20 x 31 | 22 x 36 | 30 x 38 |
| ARMS | | | | | | prone access | 22.8x17 | 30 x 20 | 30 x 24 |
| | arm to elbow | — | *clothed 4.5"D | *arctic 7"D | | catwalk | 22" H = 63 12 | 24" H = 73 15 | 32" H = 75 15 |
| | arm to shoulder | — | 4.5 sq. | 7. sq. | | normal pass | 22 x 76 | 30 x 80 | 30 x 80 |
| | finger to elbow | — | 5. D | 6.5 D | | pass sideways | 13 x 76 | 15 x 80 | 19 x 80 |
| | finger to shoulder | — | 5. sq. | 6.5 sq. | | pressure hatch | 20x44 A=16" to floor | 26x66 A=10" to floor | — |
| FINGERS | | | | | | head bent | 20 to 24 x 60 | 30x70 | 30x70 |
| | one finger | * bare 1.25"D | *gloves 1.5"D | — | | head erect | 20 to 24 x 70 | 30x 80 to 84 | 30x 80 to 84 |
| | recessed push button | 0.93 D | — | — | | two men facing each other | 30x76 | 36x 80 to 84 | 36x 80 to 84 |
| | twist access eg. hold screw | 2. D | 2.5"D | — | | two men passing abreast | 42 x 76 | 54 x 80 to 84 | 60 x 80 to 84 |
| FOOT | | | | | | | | | |
| | access to pedal | bare 4.3x11.5 | avg. shoe 4.7x12.7 | arctic boot 6.3x15.3 | | | | | |
| HEAD | | | | | | | | | |
| | head passage | bare 9.3" | military helmet 11.5" | work helmet 12.5" | | | | | |

SEATING

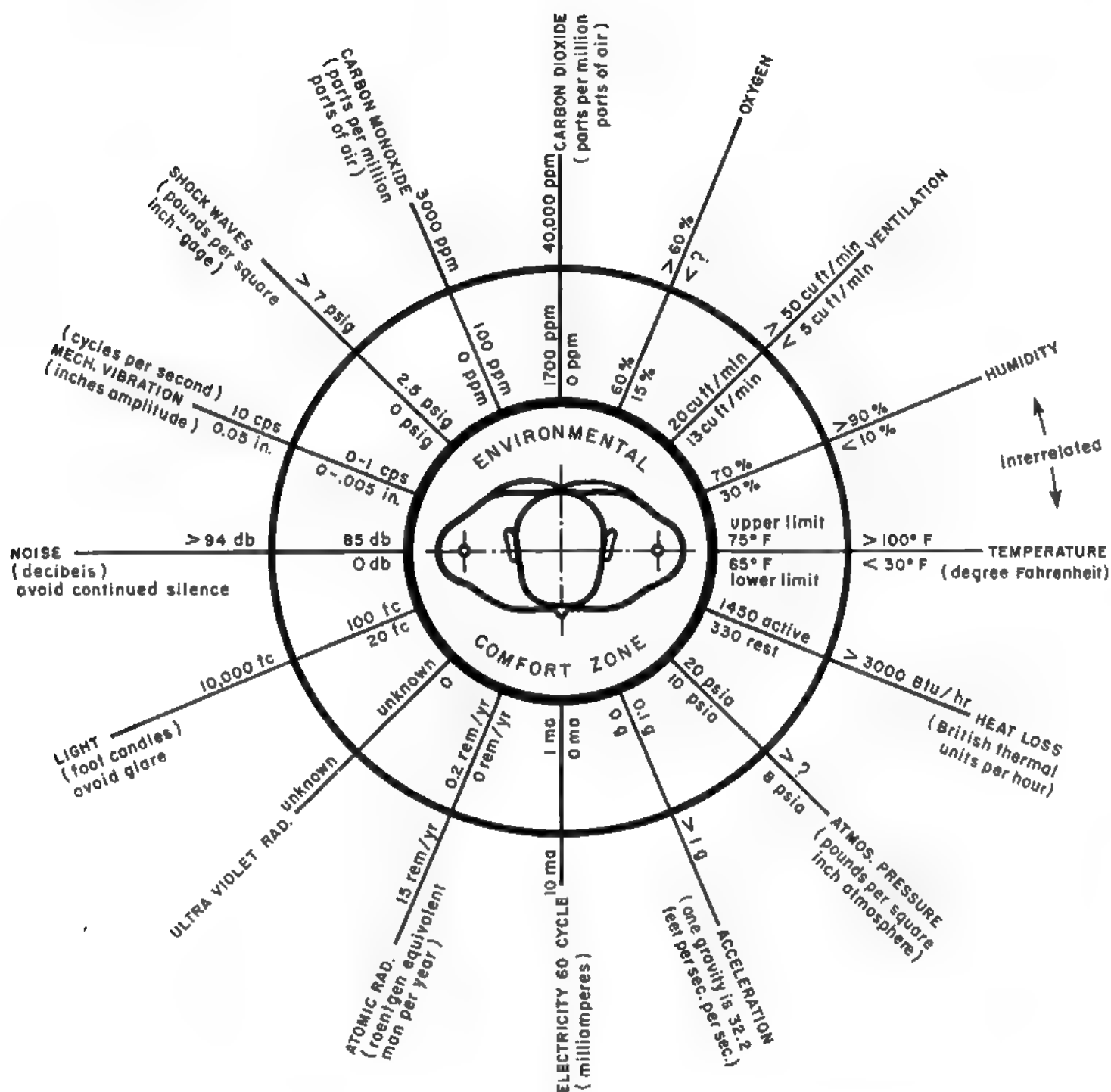


CONSOLES





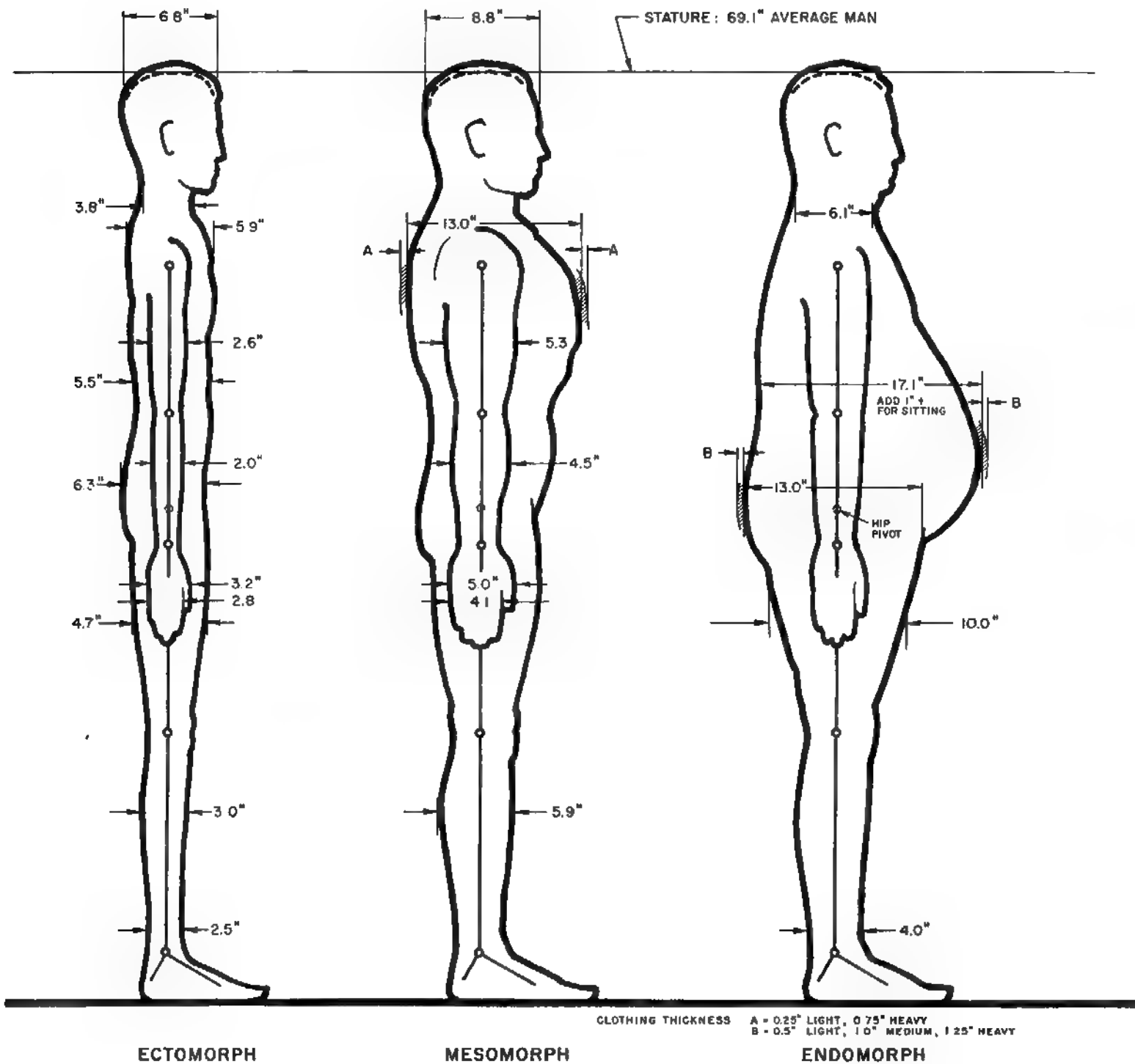
ENVIRONMENTAL TOLERANCE ZONES



THE BAND BETWEEN THE CIRCLES INDICATES THE ZONE FROM COMFORT TO THE TOLERANCE LIMIT. OUTSIDE THIS LIMIT GREAT DISCOMFORT OR PHYSIOLOGICAL HARM IS ENCOUNTERED. OTHER FACTORS NOT SHOWN AND TO BE CONSIDERED ARE: INFRA-RED RADIATION, ULTRA-SONIC VIBRATIONS, NOXIOUS GASES, DUST, POLLEN, CHEMICALS & FUNGI.

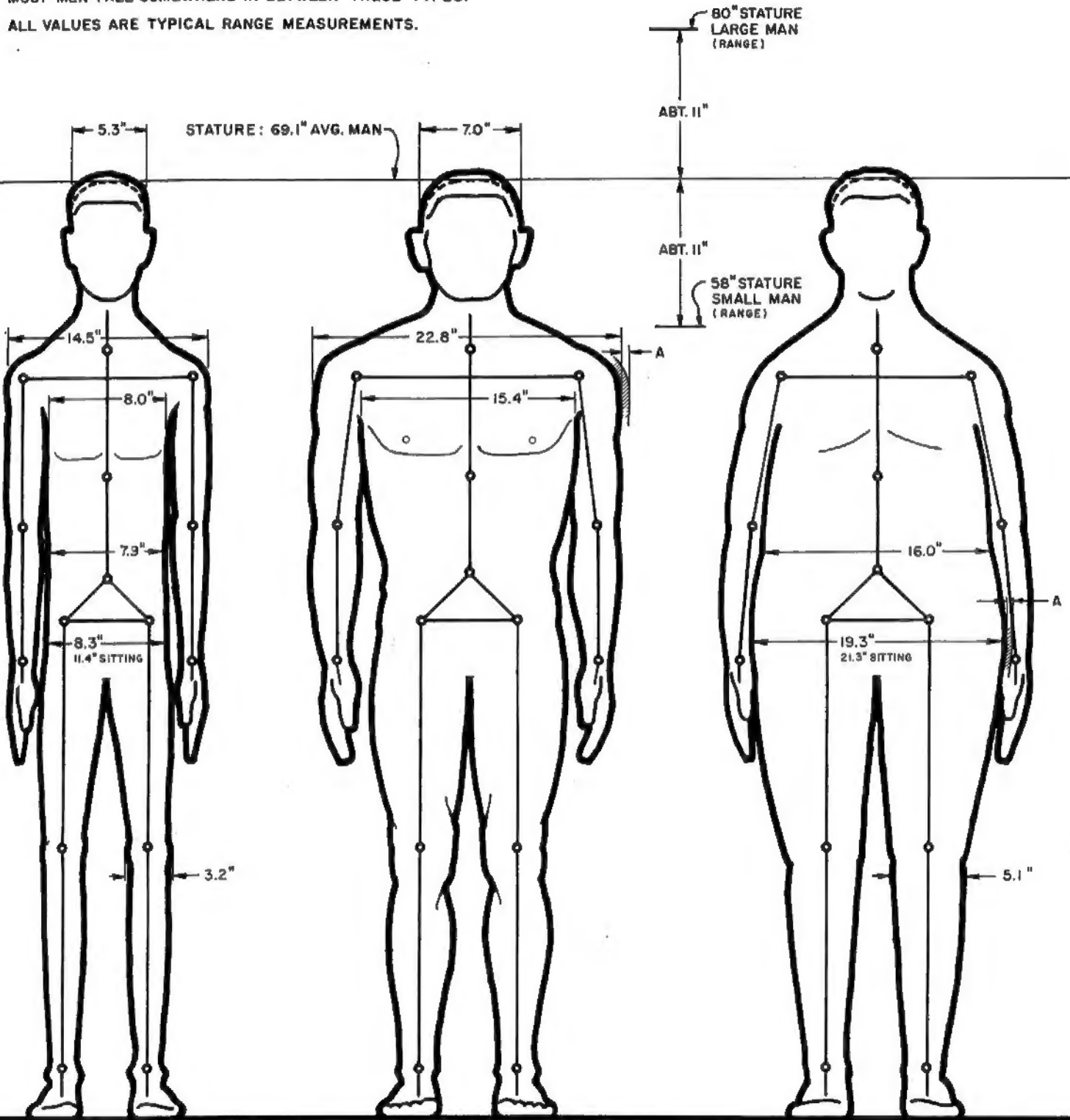
THREE BASIC HUMAN BODY TYPES

EXTREME VARIATIONS OF THE AVERAGE MAN IN THE U.S.A.
 MOST MEN FALL SOMEWHERE IN BETWEEN THESE TYPES.
 ALL VALUES ARE TYPICAL RANGE MEASUREMENTS.



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ECTOMORPH

MESOMORPH

ENDOMORPH

COMPARISON OF THE 2.5 PERCENTILE U.S. ADULT MALE IN SUMMER ATTIRE AND THE 97.5 PERCENTILE IN HEAVY WINTER CLOTHES.

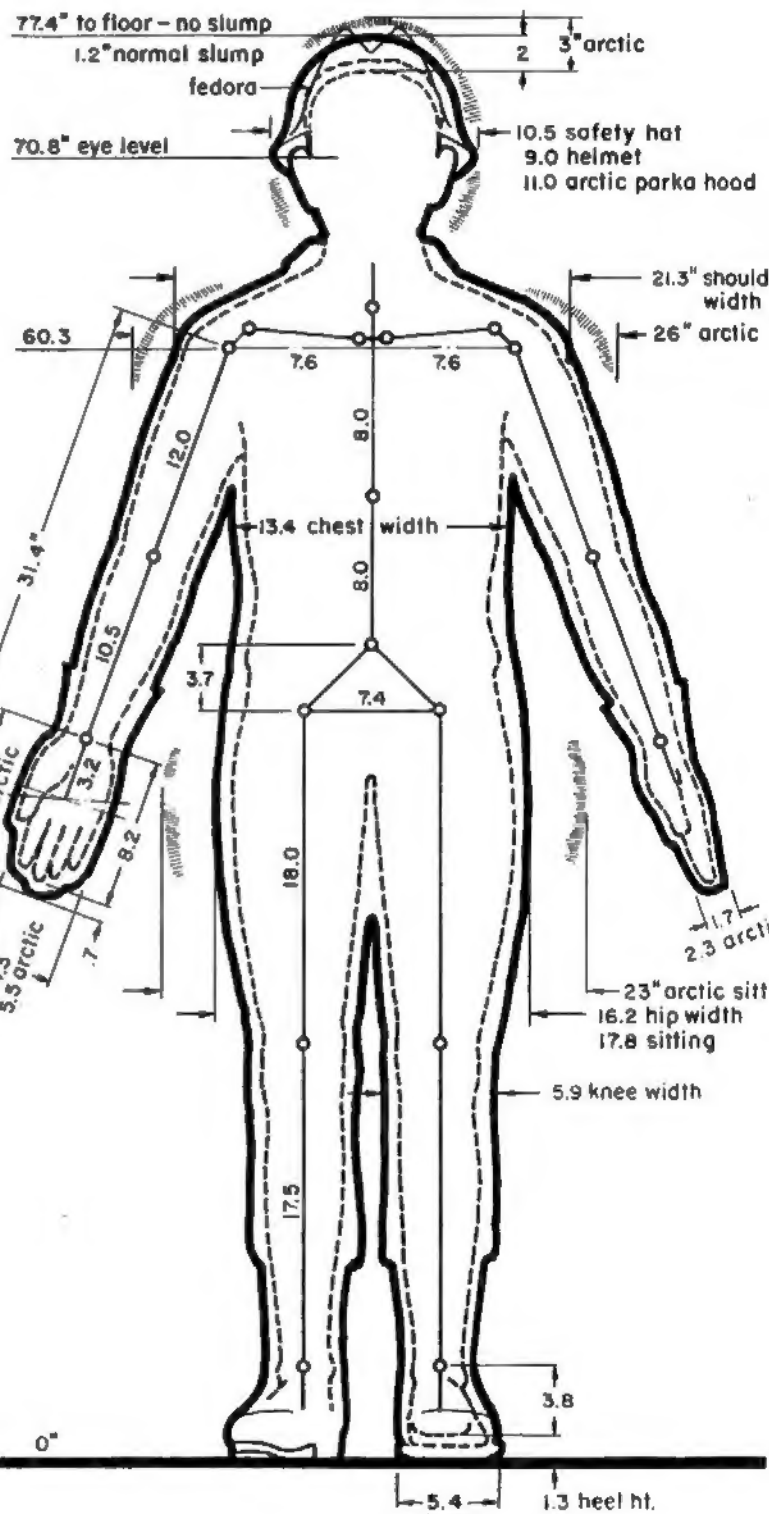
A DESIGN WHICH INCLUDES THESE 2 MEN WILL ACCOMMODATE 95 PERCENT UNDER MOST CLIMATIC CONDITIONS.

dimensions include all types of Army gear, heavy winter flying clothes (A.F.), and civilian work and street clothes.

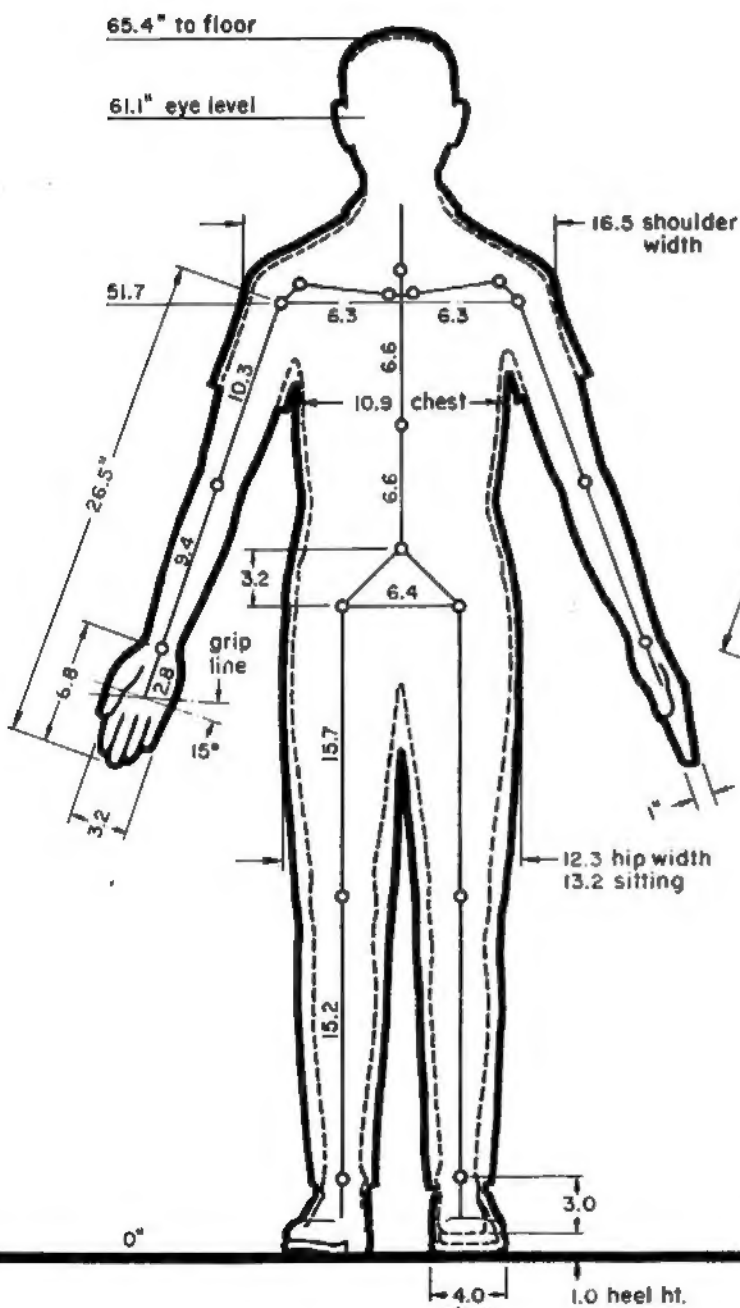
pressure suits and heated suits are not included.

data on arctic clothing is uncompressed.

97.5 PERCENTILE



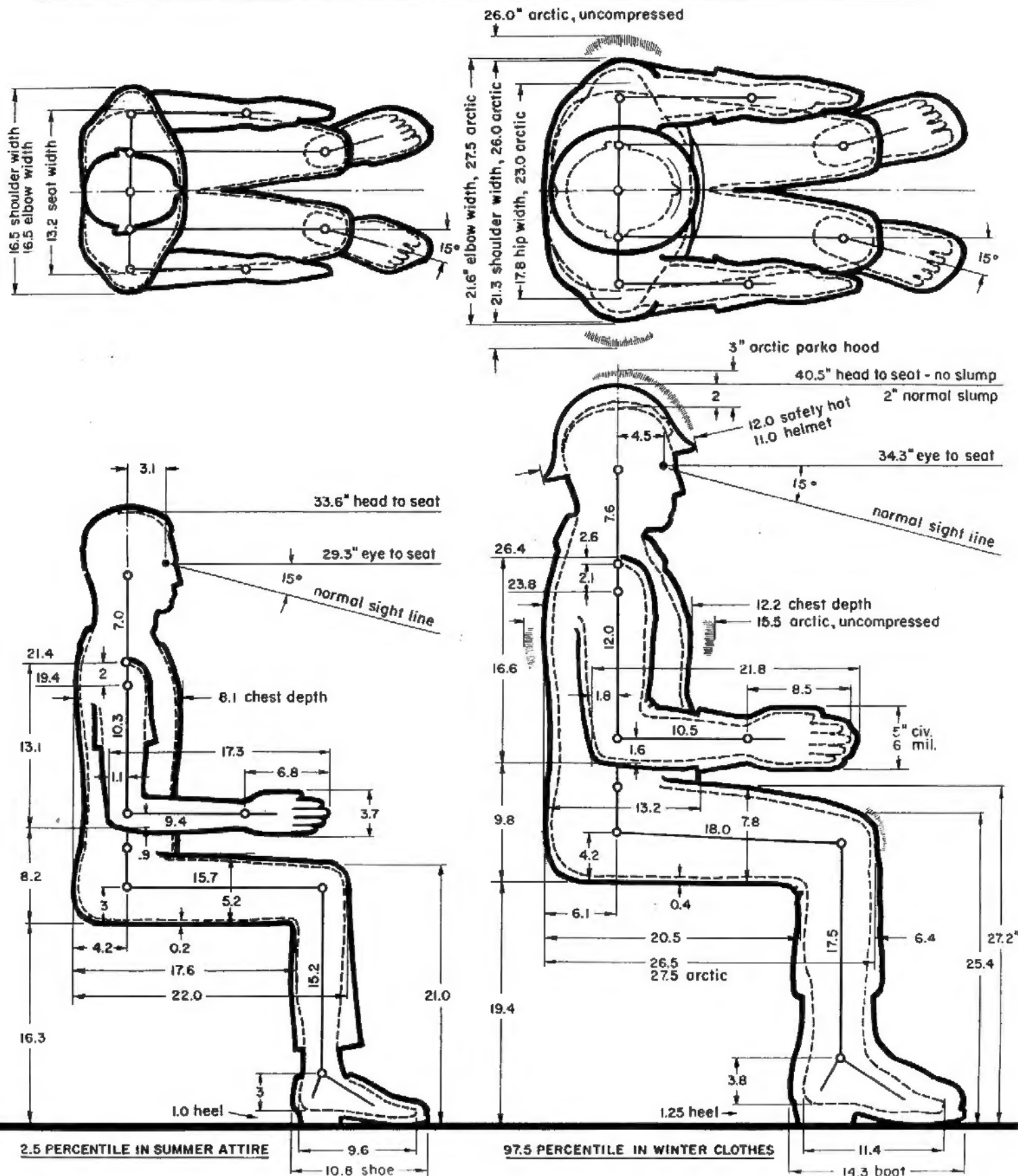
2.5 PERCENTILE

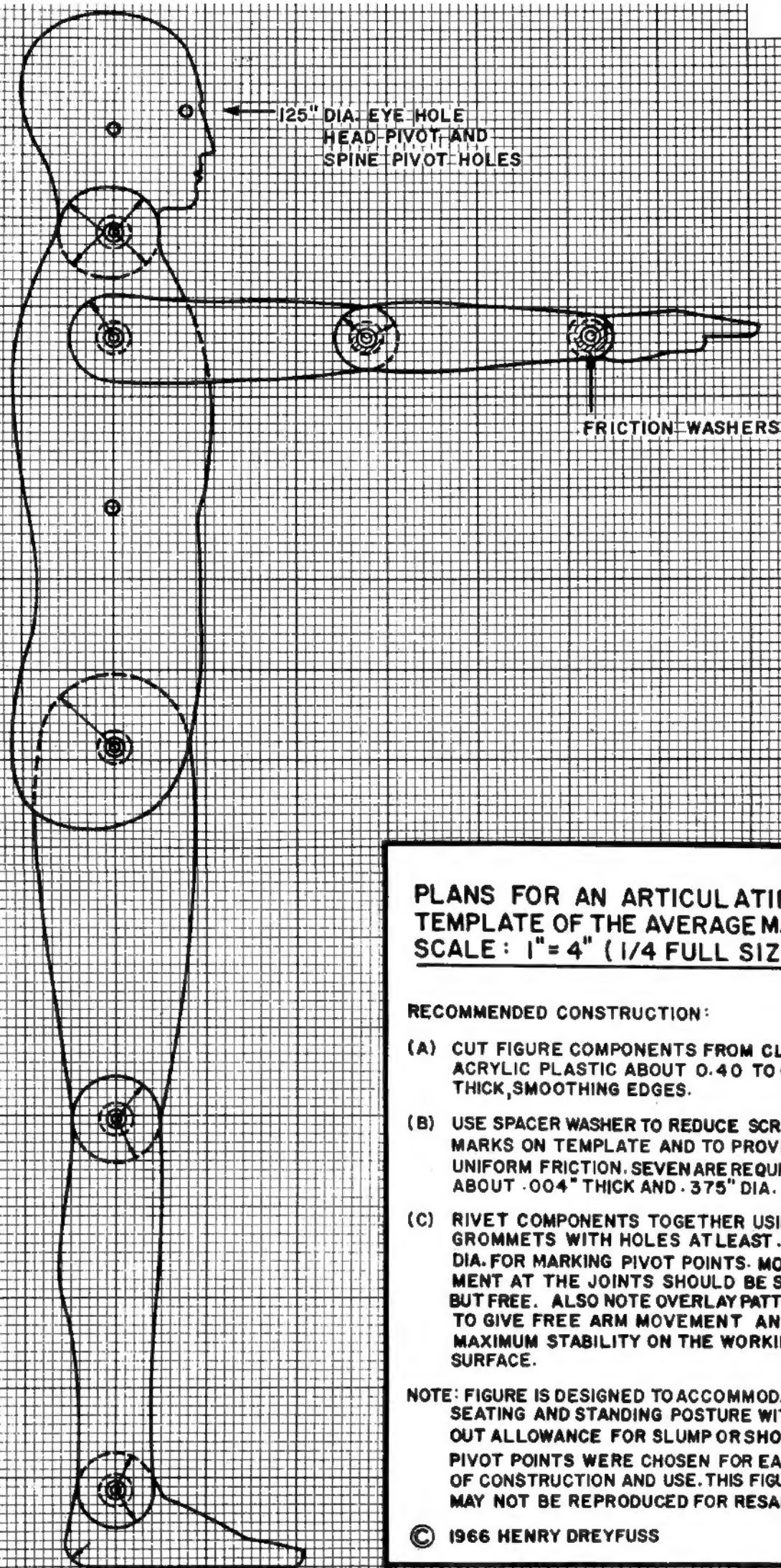


arm span 65.5"
arm akimbo span 34.9"
total weight 131.7 lb.

arm span 78.1"
arm akimbo span 43.2"
total weight 132 lb.

COMPARISON OF 2.5 PERCENTILE U.S. ADULT MALE IN SUMMER ATTIRE AND THE 97.5 PERCENTILE IN HEAVY WINTER CLOTHES





PLANS FOR AN ARTICULATING TEMPLATE OF THE AVERAGE MAN SCALE: 1" = 4" (1/4 FULL SIZE)

RECOMMENDED CONSTRUCTION:

- (A) CUT FIGURE COMPONENTS FROM CLEAR ACRYLIC PLASTIC ABOUT 0.40 TO 0.62" THICK, SMOOTHING EDGES.
- (B) USE SPACER WASHER TO REDUCE SCRATCH MARKS ON TEMPLATE AND TO PROVIDE UNIFORM FRICTION. SEVEN ARE REQUIRED ABOUT .004" THICK AND .375" DIA.
- (C) RIVET COMPONENTS TOGETHER USING GROMMETS WITH HOLES AT LEAST .094 DIA. FOR MARKING PIVOT POINTS. MOVEMENT AT THE JOINTS SHOULD BE SNUG BUT FREE. ALSO NOTE OVERLAY PATTERN TO GIVE FREE ARM MOVEMENT AND MAXIMUM STABILITY ON THE WORKING SURFACE.

NOTE: FIGURE IS DESIGNED TO ACCOMMODATE SEATING AND STANDING POSTURE WITHOUT ALLOWANCE FOR SLUMP OR SHOES. PIVOT POINTS WERE CHOSEN FOR EASE OF CONSTRUCTION AND USE. THIS FIGURE MAY NOT BE REPRODUCED FOR RESALE.